



NORTH AMERICAN ARC
ALMA Regional Center

North American
ALMA Science
Center



Cycle 1 Status & Cycle 2 preparations

NAASC Memo #

Author: J. Hibbard, NA ARC Manager

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ABSTRACT

This report summarizes the status for ALMA Cycle1 observing and progress towards Cycle2, as information provided to the ANASAC for their face-to-face meeting Sept 16-17, 2013. The information in this report is considered "Company Private" and may not be shared outside of the ANASAC membership.

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1 Cycle 1 Status

Cycle 1 science observing has been delayed for a number of reasons, and as a consequence the cycle was extended through the end of May 2014. The first announcement concerning a reprioritization of science observing to allow for observatory improvements was posted to the Science Portal (SP) on April 8:

Cycle 1 Progress Update

Apr 08, 2013

ALMA will spend the next few months giving priority to commissioning and improvements to infrastructure and overall system stability. During this time, Early Science observing will proceed at a lower priority. As a consequence, the ALMA Cycle1 observing period will be extended from the originally announced end of October 31, 2013 until at least the end of January 2014. The timescale for ALMA Cycle2 will be announced in the near future.

The results of the additional commissioning effort were largely successful (blue font indicates items where progress was made but which were not fully completed)

- Improve “handover” to science
- Improve system robustness & stability (fewer “full system restarts”; development of 3 “test suites” - observing mode test suite, software regression suite, performance regression suite)
- Completion of infrastructure (Power & distribution; pads)
- Commission cycle 1 observing modes (complete baseline correlator, multiple arrays, 43+ antenna element operations, proper motion ephemeris objects, ACA correlator, single dish observing)
- Work towards demonstrating Cycle2 capabilities (on-axis polarization, Bands 4 & 8, multiple spw per BB, 45+ antenna elements in baseline correlator, Cycle 2 data rates, longer baselines, efficient spectral scans, band-to-band phase transfer, improvements to WVR phase correction, fast switching)

Following the good progress made in April-May, and with the understanding that software acceptance would be imminent, an announcement was posted to SP on May 31 stating that “*Cycle 1 Early Science observing will resume at nominal priority in June 2013*”. It also announced extension of Cycle 1 to end of May 2014 and Cycle2 timescale (call in October, deadline in December, observations beginning June 2014).

However, June & July brought many problems – weather & power related issues lead to site closures and the subsequent warming of receivers (as reported in past ANASAC telecons). This severely limited the number of available antenna elements.

Cycle 1 Software was accepted July 24, but only for 12m Array observations. ACA observations had a blocker that is believed fixed but still needs tested. The next session after SW acceptance was devoted to CSV, the following one (Aug 7-14) to science. However, power issues limited the minimum number of science-ready antennas, and we were unable to conduct Cycle 1 PI observations. The next science observing session began on Aug 21, but the workers strike began the following day.

The array was put into “safe” mode (receivers cooled, but no observing). However, on September 6 the turbines were turned off and the site was closed, and the receivers were no longer cooled.

The workers strike was resolved Sept 8, and the following announcement was posted to the Science Portal:

Cycle 1 Status Update

Sept 10, 2013

Cycle 1 observations could not resume in June as advertised earlier, because of adverse weather conditions and power issues that limited the number of antennas available for science observations. The observatory was able, however, to advance in the software acceptance which was finalised for the 12m-Array in July. A further delay in restoring operations has been caused by labour issues which fully engaged the observatory until September 7. The process to restore full operational conditions has started, and the Cycle 1 final software acceptance and resumption of PI observations are expected in early October.

It will take several weeks to recover the array and obtain sufficient antenna elements to conduct Cycle 1 PI observing. As mentioned in the article, the current estimate for the resumption of PI observing is early October.

2 Cycle 1 Results

2.1 Observing Statistics

A total of 66 executions of 33 Scheduling Blocks (SBs) from 27 Cycle 1 PI projects were taken as part of the Software acceptance testing.

As of September 9, nine (9) executions of four (4) SBs for three (3) projects passed QA2 and were delivered to PIs. Most data failed QA2 due to reduced sensitivity as a result of the less than nominal number of array elements, so have been put back into the observing queue for additional executions. However, these data have been very useful for pipeline testing (*see Tuesday presentations on CASA and Pipeline*).

2.2 Timescales for data reduction & delivery

The table below gives the median timescales for each post-observing stage from project completion to delivery, both for Cycle 0 and for the 4 Cycle 1 data deliveries.

Median Data Processing & Delivery times (days)	Cycle 0	Cycle 1
Days since last EB observed and posting for data reduction assignment	7	35.5
Days since "available for assignment" and QA2	45	22
Days since QA2 and Delivery	12	2.5
Total time (days)	84.5	59

The Cycle 1 timescales are high in part because the data were observed during the tests from January-June, and could not be fully processed until the software was formally accepted on July 24. Even so, it is reassuring that the timescales are much reduced compared to Cycle 0. Considering the data reduction timescales for the 10 NA datasets processed through QA2 (pass or fail), the median data reduction time is 9 days (vs. 22 days above). Overall, data reducers report many fewer problems with data reduction, and the scripts are working well.

2.3 Cycle 1 Completion likelihood

A recent assessment from JAO suggests that half of Cycle 1 SBs will be completed by the end of May 2014. Additionally, there are issues with baselines in the 400m-1km range (corresponding to configurations C32-5 and C32-6) that may significantly affect our ability to finish Cycle 1 projects that require these configurations (~1/3 of all Cycle 1 SBs).

The project will assess these factors and post a "Cycle1 Status Update" to the Science Portal on October 1. Thereafter, ARC Contact Scientist will contact affected PIs and advise them that they may want to consider resubmitting for Cycle 2. If the more extended configurations are unlikely to be available, it may be possible for PIs to submit Change Requests to request a coarser resolution.

The ALMA Board will soon be presented with an assessment of the Cycle1 completion percentage. In the past, both they and the ASAC have consistently maintained that the Cycle 2 timescales remain as announced in the May announcement. We will see if this remains true in light of all recent developments.

3 Cycle 2

The Cycle 2 pre-announcement was published to Science Portal on September 12. It is expected to begin in June 2014 and to end October 2015 (17 months). Five months are reserved for the commissioning of the full ALMA capabilities (long baselines, remaining receivers, fast switching, solar observing, etc.). It is anticipated that about 2000 hours of 12-m Array time and up to 2000 hours of ACA time will be allocated for the highest ranked proposals (Grades A & B).

3.1 Basic Capabilities

- Thirty-four 12-m antennas in the main array, and nine 7-m antennas (for short baselines) and two 12-m antennas (for making single-dish maps), which together comprise the Atacama Compact Array (ACA).
- Receiver bands 3, 4, 6, 7, 8 & 9 for both the 12-m Array and the ACA.
- Total Power observations only for spectral line modes in bands 3-8 (i.e., no single dish for continuum modes or Band 9).
- Baselines up to 1 km for Bands 8 & 9 (resolution of 0.09" at 650 GHz).
- Baselines up to 1.5 km for Bands 3, 4, 6, & 7 (resolution of 0.13" at 345 GHz).
- Polarization (on-axis, continuum, set frequencies in Band 3, 6 and 7, no ACA, no mosaics).
- Both high and low frequency resolution in the same spectral setup.
- Both single field interferometry and mosaics.

3.2 Restrictions

- No limit on number of science goals
- All pointings in a Science Goal must be within 10deg; 5 or fewer tunings
- Sum over all positions in a Science Goal (offsets & sources) & associated tunings less than 150 (no additional limits on number of sources)
- Offsets designated as either mosaics (separation limit) or pointing patterns
- ACA only in concert with 12-m Array observations
- Data rate < 60 MB/s; OT warns if > 6 MB/s. Frequency binning available to reduce data rate.
- Time for additional array components (ACA, multiple 12m configs) will be fixed ratio of time for most extended 12m configuration (which is based on requested resolution & rms).

3.3 Improved OT Features

- Standard setups for continuum observations
- Spectral scans with automated tuning & visualization
- Spectral averaging to reduce data rate/volume
- Automatic array component selection based on resolution & largest angular scale (including multiple 12m configs)
- Interface for time constrained observations
- Technical justification for each SG, with detailed reporting to flag items that need specific justification

4 Cycle 2 preparations

Drafts of all Cycle2 documents have been produced. Those listed in boldface below are available to the ANASAC (*see agenda for links to these*). Final versions are due October 1 for the call on October 24.

See afternoon presentation for Cycle 2 outreach plans and user support aspects

4.1 Official Documents

- **Call for Proposals**
- Proposers “Road Map” (new SP pages)
- **Proposers Guide**
- Proposers Guide Appendix A: Cycle 2 Capabilities
- **Technical Handbook**
- **ALMA Primer**
- ALMA User Policies

4.2 “Value Added” material

- NRC Videos (**LAS**; pt sources vs. resolved)
- **“Did you know” flier**
- OT Videos
- Updated Science Portal science pages

4.3 Proposal Software tests

- Proposal review software (Ph1M) test: July 6-16: a few items identified. No showstoppers.
- OT-phase1 test1: Aug 01-16. Many bugs identified, but no showstoppers.
 - *See agenda for link to document “OT Improvements for Cycle 2”*
- OT-phase1 test2: Sept 16-20
- OT-phase2 test: Feb 4-18, 2014