

Preparing for Early Science

Introduction

To make an informed decision about Early Science, the project is pressing forward with a series of meetings and reviews in October and November. The findings and insight gained in these meetings and reviews will not only deliver input for the Early Science discussions but will also constitute the supporting documentation for the AAER 2010.

The following list describes the timing, scope and person in charge of organizing the meetings and reviews which will inform the Board's discussions about Early Science in November.

The meetings/reviews are:

October 7th-8th: CSV Status External Review (**Hills**)

October 11th-12th: Science Operations External Review, including ARCs (**Nyman**)

October 13th-14th: ASAC Meeting (**Hills**)

October 25th-28th: ALMA Annual External Review (AAER2010) (**Hasegawa**)

November 8th-9th: Array Status Review, including maintenance capabilities for hardware and software (**Chalmers / Ibsen / Kurz**)

November 10th: Observatory Readiness Review. This review will pull together the conclusions from the CSV, Science Operations and Array Status reviews, as well as the ASAC and AAER recommendations. (**Ball**)

November 16th-18th: ALMA Board Meeting (**Bocaz**)

On the topic of Early Science the Board will receive the following documents:

- Review reports with recommendations and response from relevant teams (5), including a synthesis from the Observatory Readiness Review;
- Proposed capabilities of the array at the start of Early Science and the evolution (schedule) of its capabilities;
- Status matrix for phase-1, phase-2, scheduling, archiving, data quality assurance, data reduction (CASA/Pipeline) and data distribution;
- Draft call for proposals;
- Plan for the first proposal review.

November 22nd: Early Science decision date meeting based on input from the ALMA Board and AAER. Participants: members from the JAO and Executives (ARCs), Directors Council and Board chair and vice chair (telecon). Decisions will be made regarding the call for proposal date, the Early Science observations start date and the Early Science capabilities to be offered.

The following sections give more detail, starting with the description we are working with of the conditions to be met by the start of Early Science.

Requirements and Goals for the Start of Early Science

The following description was approved by the Board at their March 2009 meeting.

A) Minimum Requirements

- At least sixteen 12m antennas fully commissioned with at least 3 receiver bands available on all antennas.
- Synthesis mapping of single fields.
- Sufficient antenna stations to provide a range of configurations covering the shortest spacings and out to at least 250 m.
- A basic set of spectral modes as previously selected by ASAC.
- Calibration of all the above to a level comparable with existing millimetre-wave arrays – requires hot/ambient loads and WVRs.
- Software to support users' applications, the preparation and execution of observations and off-line data reduction.
- After taking account of the time lost due to bad weather, power outages, equipment failures and the time needed for engineering work, at least 33% of the remaining time should be available for the Early Science observations.

B) Goals

The project will endeavour to achieve these goals, but Early Science can start without them. A readiness review will decide which of these capabilities should be announced as being available in the Call for Early Science Proposals.

- Receiver bands 3, 6, 7, and 9 available on all antennas plus bands 4 and 8 on as many antennas as we can manage.
- Synthesis mapping of extended fields using pointed mosaic mode.
- Configurations extending to baselines of 1km
- Linear and circular polarization of compact sources.
- Single-dish mapping of extended objects in both continuum and spectral line modes including on-the-fly observing.
- Calibration better than existing mm-wave arrays

Commission activities will continue after the start of Early Science, which requires simultaneous operation with at least 2 sub-arrays.

CSV Status Review

Charge to the Panel (Draft)

This review has been called by the ALMA Director to help him evaluate the state of Commissioning and Science Verification in the context of evaluating the readiness of ALMA to begin Early Science. The review will also provide feedback and guidance to the commissioning team. The Panels views are sought on the following particular topics:

1. What have been the main areas where the CSV work has gone well and what areas have been problematic?
2. How well does the progress to date match that predicted in the planning stages?
3. To the extent that it has not, what have been the main reasons for delays?
4. In the case of reasons that are internal to the organization of the commissioning effort, what changes should we make which would improve our performance in terms of schedule and delivery?
5. For the reasons which are external to the CSV team, what are the things that we should asking the Project as a whole to change that would make the commissioning process more efficient?
6. Looking forward, what remains to be done before it would be appropriate to issue a call for proposals for Early Science, and what further items will need to be completed before the observing itself can start? (Here a distinction will need to be made between the minimum requirements and the capabilities that are regarded as goals.)
7. In view of progress so far, the amount of effort available and the current forecasts for delivery of hardware and software, what timescales are reasonable for the completion of these tasks?

Comments on other topics and advice on particular technical issues will be most welcome.

Participants

Panel Members

- Robert Wilson (Harvard Smithsonian, Chair)
- Nario Kuno (Nobeyama)
- Peter Schilke (Köln)
- Melvyn Wright (UC Berkeley)

ASAC observers / assessors

- Jesus Martin Pintado (ASAC)
- Douglas Johnstone (ASAC)
- Joe McMullin (EVLA)

Other Participants / Observers

- CSV team members, ALMA Director and Deputy Director, Head of Science Operations, members of Management IPT as available, Lead Systems Engineer and System Verification scientist, Computing IPT representatives, ARC representatives.

Agenda (Draft)

1. Introduction – context of the review (Thijs, Richard)
2. Status of construction and AIV (Dick / Nick)
3. Summary of the original Implementation Plan and commentary (Richard)
4. Current Organization of Team and Staffing (Alison)
5. Presentations on the Major Areas by Group Leaders (progress/problems/plans)
 - Antennas
 - Systems
 - Correlator
 - Calibration
 - Imaging
 - Observing Modes
 - Documentation
6. Other Topics
 - Fast Scanning for total power measurements
 - Polarization issues
7. System Verification (Morita-san?)
8. Progress Summary (Alison)
9. Problems affecting CSV (Richard)
 - “Top Ten” issues
 - Reliability of hardware and infrastructure
 - Effect of remaining construction items
10. Software matters (Alison / Robert)
11. Science Verification
11. Plans for next six months and outline to completion (Alison)
12. Early Science Requirements and Goals (Richard / general discussion)
13. Plans for Operations (Lars-Ake)
14. Conclusions

The Science Operations Readiness Review

Charge to the Panel

This review has been called by the ALMA Director to help him evaluate the readiness of the DSO and ARCs for Early Science Operations, and in particular to review and verify the following:

1. DSO and the ARCs are well prepared to successfully conduct Early Science Operations and support the user community in proposal preparation and data processing.
2. Production and delivery of the call for proposals (CfP) documentation is well under way and the proposal review process steps are well identified, described and prepared.
3. Plans for software development, delivery and testing are timely and well organized.
4. Production and delivery of user documentation are well advanced to be available in time.
5. The most important operations procedures are identified and ready or sufficiently developed to ensure readiness for Early Science.
6. Plans for data distribution between the archives and procedures for data delivery to the PIs are sufficiently developed to ensure readiness for Early Science.
7. Reduction of ALMA data using CASA and CASA support have been successfully demonstrated.
8. Interaction procedures between DSO and the ARCs are in place.
9. Interaction procedures between DSO and the JAO departments of engineering and computing are well defined and mostly in place.
10. The most critical elements have been identified and are under control together with a risk mitigation plan.

Participants

Panel Members

- George Helou (Chair)
- Jessica Chapman
- Michitoshi Yoshida
- Mark Phillips

ASAC observers

- Toshikazu Onishi
- Andrew Baker
- Frédéric Gueth

Other Participants

JAO and ARC staff: Richard Hills, Alison Peck, Brian Glendenning, Gianni Raffi, Alisdair Manning (video or in person), Maurizio Chavan (video), Alan Bridger (video), Crystal Brogan, Dean Chalmers, Doug Johnston, Jorge Ibsen, Nick Whyborn, Dick Kurz, Tetsuo Hasegawa, Carol Lonsdale, Andreas Kaufer, Fernando Comeron, Regional Project Scientists, Ryusuke Ogasawara, Koh-Ichiro Morita.

Agenda

1. Introduction (Thijs, Lars-Ake)
2. Construction status update (Dick Kurz)
3. CSV status update (Alison/Richard)
4. Proposals and the proposal review process
 - Program flow (Lars-Ake)
 - The User Portal (Stephane, Alisdair)
 - Proposal preparation (Mark)
 - Proposal submission (Mark)
 - Proposal review process (Ruediger)
5. Operations
 - Array Operations (Juan)
 - Observations (Baltasar, Bill)
 - Archive Operations (Alisdair, Jorge Ibsen, Stephane, Baltasar, ARC)
 - Data Management (Quality Assurance, Trend Analysis, Calibration) (Baltasar, Bill)
 - Data reduction (Crystal, Brian)
6. Users and User support
 - Preparations of the ALMA community (ARC staff, Tommy)
 - Helpdesk (John)
 - Face-to-face support (ARC staff)
7. Early Science Operations
 - Early Science Operations (Lars-Ake and Baltasar)
 - DSO and the ARCs
8. Integrated schedule to Early Science Operations
 - CIPT status update (Brian, Jorge Ibsen)
 - The Schedule (Lars-Ake)
 - Integration and testing (Mark)
 - Risks (what are the critical items, Plan B) (Lars-Ake)
9. Summary: Are we ready for Early Science Operations? At which date?