



ALMA BOARD

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Purpose of Document: To provide the ALMA Board with the March 2025 ASAC Report

Status: To be noted by the Board in the April 2025 Meeting

ALMA Science Advisory Committee (ASAC) Report to the ALMA Board - Spring 2025

Yuri Aikawa, Sean Andrews, Arnaud Belloche, Sara Ellison (absent), Maryvonne Gerin (EU Vice-Chair), Ágnes Kóspál, Li-Hwai Lin, Anaëlle Maury, Stefanie Milam (Chair), Neil Nagar, Hideo Sagawa (EA Vice-Chair), Kazushi Sakamoto

General Considerations:

- ASAC is increasingly concerned with the delays of reviews for WSU. Evaluation of risks in such delays and a detailed flow of the WSU critical path will better inform ASAC and the community on the impact of such delays to science.
- ASAC was pleased to have the Board Science Committee (SC) Chair join the meeting and take time on the agenda to directly address and respond to questions from the committee. Clarification on the SC response was offered and provided clarity on decisions made at the Board level. We hope this practice will be routine in the future and will keep the Science Committee Chair on the agenda for ASAC meetings in the future.
- ASAC would like the Board to consider the goal of Permanent Charge 2 “Recommendation of ways to maximize ALMA's scientific impact: This includes review of the scientific effectiveness of the ALMA Archive, proposal tools, and the Proposal Review Process as well as *the current scientific impact of ALMA*” and some guidance of what is expected in the evaluation of *current scientific impact of ALMA*. ASAC will need to ascertain what is needed to properly evaluate this, and understand what criterion should be used, what metrics are needed for this, and what cadence may be appropriate. Also, consideration for outsourcing some metrics/statistics could be done to offset the burden from JAO staff if the cost/time balance is reasonable for a periodic cadence.

Permanent charges

1. Assessment of the performance of ALMA scientific and technical capabilities: The JointALMA Observatory (JAO) shall provide the appropriate information needed to perform this assessment.

Recommendations/issues:

- ASAC celebrates with ALMA a very successful start to Cycle-11 including the time allocated for high-frequency observations. We commend the efforts of all involved!

- ASAC appreciates the update to the cybersecurity plan/management and that it is being implemented. ASAC expects ALMA to maintain this plan and best practices for cybersecurity.
- ASAC acknowledges the challenges presented with the Baseline Correlator subarray crosstalk for Bands 9/10, and that the issue has been identified and actions are in place to mitigate it. It is understood that there are resource limitations, however, ASAC encourages JAO to resolve the problem such that the 12m and 7m arrays can be used in parallel again for these Bands.
- The progress of the WSU, especially with regard to its impact on regular observations, is of great interest to the community. ASAC appreciates ALMA informing the community of the plans and potential impact for Cycle 13 science with the Cycle 12 call for proposals.
- ASAC is pleased to see the high completion rate of A ranked and B ranked projects early in Cycle 11. There is still some concern that the completion rate of polarisation projects has dropped in cycles 8 and 9 as compared to earlier cycles. As polarisation is a key feature of ALMA, ASAC encourages ALMA to continue to monitor the completion rate of polarisation projects, and actions are implemented in a timely manner to mitigate if it remains low.
- ASAC congratulates ALMA for the timely auto delivery of MOUS, which leads to a fast delivery of the data to the PIs and their teams.
- ASAC congratulates the observatory for the increased efficiency in performing the maintenance of the arrays, thereby offering more time for science.
- ASAC is pleased to learn that the JAO has updated the system to track the regional share of the actual (successful) observing time. An annual report on the actual times (ASAC Fall Meeting) would be appreciated with a detailed plan of action to account for imbalance under the 2-year policy of ALMA. These annual regional time allocations should be made available for users.

2. Recommendation of ways to maximize ALMA's scientific impact: This includes review of the scientific effectiveness of the ALMA Archive, proposal tools, and the Proposal Review Process as well as the current scientific impact of ALMA.

Recommendations/issues:

- ASAC encourages ALMA to continue discussions on filling gaps in the observing queue efficiently and would appreciate details on the procedure employed for a broader community understanding. ASAC requests an update on the outcome of the discussion at

the ASAC fall meeting, including whether the information provided in the call for proposals led to a more equalized time pressure.

- ASAC is appreciative of ALMA's continuous monitoring of potential biases in the Distributed Proposal Review (DPR) process. ASAC recommends a detailed comparative analysis of the first four cycles of DPR in the fall meeting to evaluate the process and improvements made to date as well as consider other methods to improve DPR. ASAC would be receptive to working with the JAO on other ideas and methods to consider for future cycles to help balance the onerous nature of the proposing/reviewing process for a highly oversubscribed facility.
- ASAC is appreciative to ALMA for providing information about ALMA publications in ADS. As this may be useful to the broader community for various reasons, ASAC encourages ALMA to inform users of this option to collect publication metrics from ADS (e.g., email to the community; post some guidance on the archive). Evaluating the science impact of ALMA will require certain metrics to be provided (e.g., publications, citations, PhDs based on ALMA data, prizes, etc. - to be determined by the SC) in order to properly assess this part of the charge. ASAC will consider other qualitative aspects of ALMA success. ASAC does not see a need for this evaluation of science impact more than once per year.

3. Reporting on operational or scientific issues raised by the wider community as communicated by the three regional Science Advisory Committees (ANASAC, ESAC and EASAC).

Recommendations/issues:

- The regional SACs have expressed continued interest in understanding the balance of time for each region.
- There were no wider community concerns addressed with the regional SACs for this meeting.

4. Assessment of the scientific impact of the ALMA Development Program, with focus on the Wideband Sensitivity Upgrade (WSU) capabilities as well as its implementation.

Recommendations/issues:

- ASAC strongly supports WSU development efforts and maintaining a goal for x4 bandwidth expansion.
- ASAC requests a top-level progress report with updates on a critical path, schedule, risks being monitored, and progress on hardware/software be provided prior to development presentations for general understanding and guidance on what presentations will cover which areas.

- ASAC appreciates the efforts made to build a new software superseding CASA. The timeline for RADPS deployment, planned for 2 or 3 years after the WSU is operational, is a major concern, and we encourage ALMA to pursue this effort in a timely manner and deliver RADPS closer if not in sync with WSU.
- ASAC is concerned with onerous data challenges before the community with WSU. ALMA should consider how computational resources could be balanced with resources at ARCs that are accessible to the broader community for timely and equitable access for data reduction.

ASAC continues its strong support of WSU as its impact on the scientific capabilities of ALMA will be transformational. The development programs for WSU should be continued. We are pleased to hear about their progress through the presentations from the NA/EU/EA regions. ASAC considers the Band 6 v2 receiver upgrade a top priority and strongly supports its timely installation. Achieving the 4x bandwidth increase is essential to unlocking the full scientific potential of WSU.

Software / RADPS is critical to ensure the full fruition of WSU. ASAC is concerned with the delayed deployment of RADPS, and we encourage ALMA to pursue a delivery of RADPS closer to, if not in sync with, WSU. In this effort, ASAC encourages collaboration to use the best state-of-the-art techniques, both for data archives handling and for HPC computing, such as the ones actively developed for low-frequency astronomy currently.

For the WSU era and beyond, it is important to have development programs that enable users to efficiently handle the large influx of WSU data, as well as developments that prepare for the post-WSU updates including upgrading all ALMA bands. ASAC stresses that the new capabilities developed with WSU for the ALMA observatory pose a risk of creating an unequal system of access to science, disadvantageous to communities with limited computational resources. Only a virtual observatory and resource center operated by the ARCs, with open resources available to all communities, will ensure that this data can be processed in a productive and equitable manner.

ASAC appreciates the regional development presentations and updates and would appreciate presenters to flag us with areas/types of input needed from the science community.

5. Providing comments on community initiatives regarding ALMA capabilities beyond ALMA 2030 once a year.

With this new charge, the ASAC will need to poll their communities, and identify/trigger initiatives for building community-wide roadmaps, in the respective regions. Despite asynchronous rhythms of events and efforts, a summary will be provided in the Fall meeting.