



ALMA BOARD

ALMA EDM Document	AEDM 2022-040-O
Distribution	Ordinary Session

Subject: October 2022 ASAC Report to the ALMA Board

AUTHOR(S): Mario Tafalla & ASAC

Purpose of Document: To provide the ALMA Board with the October 2022 ASAC Report

Status: To be noted by the Board in its November 2022 Meeting

2022 October 29

ALMA Science Advisory Committee (ASAC) Report to the ALMA Board

Anne Dutrey, Maryvonne Gerin, Viviana Guzmán, Meredith Hughes, Stefanie Milam, Alexandra Pope (NA vice-chair), Erik Rosolowsky, Hideo Sagawa, Nami Sakai (EA vice-chair), Kengo Tachihara, Mario Tafalla (chair), and Serena Viti.

General considerations

The second ASAC meeting of 2022 was held virtually in three two-hour-long sessions during October 11-13. To maximize the discussion time, all presentations were pre-recorded and made available two weeks prior to the meeting. The presenters attended the meeting and answered questions that were posted in advance by the ASAC or that were asked during the subsequent discussion. As a result of this new format, most of the meeting time was used to discuss and clarify issues instead of passively listening to the speakers. We warmly thank all the presenters for their work, and appreciate the high quality of the material that was prepared for the meeting. While we do not rule out presential ASAC meetings in the future, we find that the remote option can be productive, accommodate external experts for specific topics, and help to lower ALMA's carbon footprint.

The meeting included presentations and discussions with ALMA director Sean Dougherty, Department of Science Operations head Liz Humphreys, Observatory Scientist John Carpenter, NA ALMA Program Scientist Crystal Brogan, EU ALMA Program Scientist María Díaz Trigo, EA ALMA Program Scientist Daisuke Iono, DTS project team manager Miho Fujieda, Band 1 Project Scientist Hsi-Wei Yen, JAO Development Project Manager Carla Crovari, NA ARC Manager Catherine Vlahakis, and Proposal Handling Team Lead Andrea Corvillón. The meeting was also attended (among others) by James Di Francesco as a liaison to the ALMA Board Science Committee, who provided valuable input on the ad-hoc charges. The ASAC thanks all the participants for their time and contributions. The material from the presentations and the content of the subsequent discussions has been used to prepare this report. We provide answers to the six ASAC permanent charges and to two ad-hoc charges.

Permanent Charge #1. Assessment of the performance of ALMA scientific capabilities: The ASAC shall indicate what information is required from the Joint ALMA Observatory (JAO) to perform this assessment.

Recommendations/issues:

- ASAC supports the scientific capabilities being planned for Cycle 10, and is excited to see that they include Band 1 observations, the new ACA Spectrometer, and further modes of band-to-band calibration.
- ASAC supports the Wideband Sensitivity Upgrade as the top priority initiative for the next years to achieve the goals of the ALMA2030 Roadmap.
- ASAC recommends as a following priority multi-cycle proposals to promote monitoring and related observations as well as high dynamic range observations with different configurations.
- ASAC supports the modification of the scheduler algorithm to boost lower-ranked high-frequency programs upward to improve the completion rate of the high-frequency programs.
- ASAC recommends assessing the possibility of daytime observation in high-frequency under very good weather conditions, possibly assisted by the band-to-band phase-transfer method.

ObsMode2022. The ASAC strongly supports the new scientific capabilities for Cycle 10 described in the latest ObsMode2022 timeline. While their individual implementation still depends on go/no go decisions to take place after the ASAC meeting, we are excited to see that a number of new important features will likely be offered in Cycle 10. The deployment of Band 1 is very advanced, with 32 receivers integrated in front-ends, and 27 of them already integrated in antennas. Science Verification observations for this band are being planned for December (more on this below). The new GPU-based ACA Spectrometer was installed last February, has carried out first-light observations, and its acceptance review is scheduled for early November. Additional capabilities for Cycle 10 include band to band calibration (B2B) for both the 12m and 7m arrays, solar polarimetry in Band 3, high data rates, 4 bit quantization, total power spectral scans for Band 8, and VLBI.

Future capabilities. The ASAC strongly supports the Wideband Sensitivity Upgrade as the top-priority scientific capability for the rest of the decade in order to achieve the ambitious goals

of the ALMA2030 Development Roadmap. If enough resources are available for implementing additional capabilities, the ASAC recommends considering multi-cycle proposals. This type of observation is already established as written in Principles of ALMA Proposal Review, but it has not been implemented yet. ASAC recognizes that it is demanded for some scientific interests, and encourages a smooth implementation of this mode.

High-frequency SB completion rate. ASAC recognizes that there is still room for improvement in the SB completion rates, especially for high frequency observations. This can be mitigated by modifying the weighting algorithms of the scheduler software, e.g., boosting lower-ranked high frequency programs to move upward in good weather conditions. JAO has already implemented some of these measures, and time is needed to evaluate if they are effective. See also descriptions in the section of the ad-hoc charge #2 below.

Personnel issues. ASAC is concerned about the negative effects of frozen positions of engineers, and employees working under intense stress. ASAC understands that some positions are now being unfrozen and hopes that the situation will be relieved soon.

Permanent Charge #2. Assessment of the technical aspects of the ALMA system performance: The ASAC shall indicate what information is required from the JAO to perform this assessment.

Recommendations/issues:

- ASAC congratulates JAO for their very efficient run of Cycle 8. This cycle has been the second most productive one in ALMA's history in terms of data acquisition. In addition, JAO has been able to deliver 50% of the MOUs to PIs in just 10 days. These are impressive milestones that testify to the dedication and hard work of the ALMA staff.
- ASAC warmly acknowledges JAO for the very detailed investigation of the array downtime. This investigation will hopefully help increase the array efficiency. ASAC strongly encourages JAO to continue this type of analysis in future cycles.
- ASAC thanks JAO for their study of completion rates. The study shows how ALMA has been able to maintain a constant completion rate over the last five cycles despite projects becoming longer. It also shows that about 25% of "high priority" projects do not receive any data at the end of the cycle. ASAC recommends that JAO educates the community on the meaning of "high priority project" to avoid wrong expectations on their completion.

Data acquisition and processing. Data acquisition on the 12m array during Cycle 8 (closed 30 September 2022) was 3,642 hours, which is 200 hours higher than achieved during the last pre-covid cycle (Cycle 6) despite Cycle 8 having 500 hours of more weather downtime than Cycle 6. This makes Cycle 8 the second most productive cycle in ALMA's history, only bested by Cycle 5, which was 150 hours more productive. In addition, data processing during Cycle 8 has proceeded very efficiently, with 90% of the MOUs delivered to PIs within 33 days, and an

impressive 50% of MOUs delivered within 10 days. The ASAC congratulates the ALMA staff for these accomplishments, which testify to their commitment to the instrument and their hard work.

Downtime investigation. The ASAC was very pleased to hear about the detailed investigation of the array downtime carried out by JAO during Cycle 8. This investigation has determined how many hours of the cycle were spent in different activities that include engineering, successful calibrations, weather loss, and fully productive time, among many others. As a result, the investigation provides a very detailed picture of a full cycle's time at an hours level, and can be used as a tool to study ways of increasing the observing efficiency of the array. The ASAC congratulates JAO for the study and encourages its repetition in future cycles to assess further attempts to improve the observing efficiency. The ASAC also notes that the investigation shows that reaching the 4,300 hours of productive observing time per cycle, currently set as a goal, is truly ambitious, and reaching it will require very strict time management.

Completion rates study. The ASAC thanks JAO for carrying out a study of project completions in response to previous ASAC requests. This study has determined the fraction of completion of A+B projects during cycles 4-8. The results show that despite projects becoming longer with each cycle, the completion rate has remained constant over the period covered by the study. The fraction of fully completed projects always stays around 45-50%, and partly completed projects comprise about 25%, with a rather flat distribution of completion fractions. Finally, about 25% of the projects seem to obtain no or negligible data. The study shows how JAO has been able to successfully handle increasingly longer, and likely more complex, projects over the years, which is remarkable. It also shows that a significant fraction of projects will not get data at the end of cycle despite having been classified as "high priority." It seems therefore important that JAO educates the community on the true meaning of "high priority projects," to avoid the disappointment of PIs who do not get data despite their proposals having obtained such a promising rating.

Permanent Charge #3. Assessment of the science outcomes from ALMA: Statistics on publications, citations, press releases, web sites, etc. collected by the Executives shall be collated by the JAO, and analyzed by the ASAC.

Publications. The statistics on publications are considered once per year and they will be revisited at the Spring 2023 ASAC meeting.

ALMA Conference. ASAC was informed by John Carpenter about the preparations for the conference "ALMA at 10 years: Past, Present, and Future" that will take place in Puerto Varas (Chile) during 4-8 December 2023. The ASAC members have been invited to be part of the Scientific Organizing Committee and are glad to accept. The ASAC strongly supports the organization of this meeting that will celebrate the first decade of ALMA and will highlight future developments, like the Wideband Sensitivity Upgrade. The ASAC also supports the use of a hybrid format to include the largest possible community.

Permanent Charge #4. Recommendations of ways to maximize ALMA's scientific impact: This includes review of the scientific effectiveness of the Proposal Review Process after each Proposal cycle.

Recommendations/issues:

- While ALMA is doing amazing science, there is concern that not all subfields are flourishing with ALMA. ASAC would like to understand what science priorities are driving the observatory and suggest that JAO clearly communicates these priorities to the community. ASAC offers to help with this issue and would be keen to have a charge specifically related to determining what the broader astronomical community thinks ALMA's science priorities should be.
- ASAC is very supportive of the implementation of AI techniques to better match proposals to reviewers in DPR. This is promising to have significant improvements for DPR. We look forward to seeing this implemented in Cycle 10.
- ASAC suggests that increasing the number of science categories and revising the science keywords might also contribute to better matches and we encourage JAO to also consider this for Cycle 10 proposal review.
- While Stage 2 of DPR doesn't appear to make a big difference in reviews or rankings, ASAC recognizes that it can provide training for early career astronomers and recommends that it continues with better guidance for reviewers on how to use it and increased capabilities for reviewers to communicate and increase their responsibility for their comments.
- ASAC suggests adding additional "external" reviewers to DPR in cases where reviewer expertise in certain areas is missing.
- ASAC asks JAO to explore ways to test if the top proposals from DPR relative ranking are the same if the proposals were given an absolute score.

ALMA science portfolio. ASAC is concerned about the diversity of science coming from ALMA and whether the balance between small/medium/large proposals is appropriate. Programs are trending larger and, as a result of large programs and high oversubscription rates, there is a risk that less variety of science is approved. This is causing stress for small subfields, and those user communities are concerned. ASAC asked if there is a document that outlines the science priorities for ALMA and was told there isn't such a document. ASAC feels that having these priorities clearly spelled out and communicated to the community is the way to drive the balance between small/medium/large programs. These science priorities can include things like science

impact through publication metrics, having a diversity of science, opening discovery space, training of early career researchers, serving all subfields, etc. JAO could survey the wider community about what they think ALMA's science priorities should be. ASAC offers to help with this and would welcome an ad hoc charge to help digest the results of such a survey and/or review a draft of the science priorities document.

DPR analysis. ASAC commends the JAO on another very thorough analysis of the implementation of DPR and careful attention to any biases in the process. By identifying even low significance biases, JAO can mitigate these effects by tweaking the process.

Quality of comments. The community frustration in the DPR process and specifically the quality of the comments continues. Since DPR is likely here to stay, JAO should work hard to optimize the process and minimize community dissatisfaction. ASAC is supportive of exploring ways to better match proposals to reviewers and AI techniques look promising. Increasing the number of scientific categories and revising the keywords might also be a way to improve matching. ASAC also briefly discussed whether there could be a way to incentivize quality reviews, although most solutions discussed are quite complicated to implement.

Post review survey. ASAC appreciates the survey that JAO conducts after DPR to gauge reviewer and proposer satisfaction. Asking if comments are useful/helpful is good but another informative question to ask might be whether the comments match the proposal ranking.

Stage 2. ASAC discussed the statistics on Stage 2, which appear to show that Stage 2 is not making a statistically significant difference in the reviews or rankings. Nevertheless, ASAC notes that Stage 2 can provide useful training for early career astronomers who are new to proposal reviews. ASAC suggests that the communication to the reviewers on the role of stage 2 could be made clearer to improve the quality of the proposal selection process. JAO might consider ways to maximize the responsibility of each reviewer. For example, in Stage 2, the reviewers could flag proposals with high dispersion of scores, have the option to point out the wrong part of the other reviewers comments and have a mechanism for the other reviewers to respond. JAO should consider if the anonymity of reviewers in Stage 2 is needed, especially since the ranks are hidden, and removing this anonymity might incentivize reviewers to provide more details and careful comments.

Proposal set limits. ASAC supports limiting the number of proposal sets per reviewer (e.g. to 5 sets as proposed by JAO). ASAC also suggests JAO might consider including additional external reviewers to cover science areas not well represented by DPR reviewer expertise (these could come from the pool of co-Is on submitted proposals).

DPR rankings. ASAC discussed how ALMA DPR does relative rankings for proposal subsets and not absolute grading. ASAC would like to see the impact of this choice and suggests that, in a future cycle, reviewers are asked to provide both a relative ranking and an absolute score.

This would allow JAO to verify that the top 10% of proposals are robust against which method is chosen.

Permanent Charge #5. Reporting on operational or scientific issues raised by the wider community as communicated by the three regional Science Advisory Committees (ANASAC, ESAC and EASAC).

- The three regional Science Advisory Committees have received concerns about DPR, especially from users in minority fields. ASAC requests that JAO approach the communities of these fields and addresses their concerns to increase their confidence in a fair review process.
- ASAC is concerned about the bias against proposals led by EA females that appeared in Cycle 9, and requests that JAO continues investigating the issue in future cycles to determine its origin.
- ASAC requests that JAO studies possible solutions to address the issue of partly completed projects that cannot be finished in following cycles and lead to unused data.

DPR issues. Issues related to community concerns about the proposal review process, and in particular DPR, were raised during the meetings of the three regional Science Advisory Committees. A number of concerns were communicated to the SAC members either privately or formally, and this suggests that there is an increasing concern on the ALMA review process by users, especially those belonging to minority fields. Issues related to DPR are further described when dealing with Charge 4. Here we stress the importance that JAO continues monitoring the impact of the review process on the different fields, and especially the minority ones. We also recommend that JAO reaches out to these communities to address their concerns and to increase their trust in a fair review process.

Bias against EA female proposers. ASAC appreciates the investigation by JAO of the possible biases in the review process, and is concerned by the finding in Cycle 9 of a bias against EA female proposers. This bias is surprising in the context of a dual anonymous review, and its origin is not understood, especially given it was not present in previous cycles. ASAC requests JAO to continue looking at this issue in following cycles to determine whether it is a statistical fluctuation or represents a deeper issue (e.g. Impostor syndrome yielding to lower number of hours requested or EA female preferentially working on minority fields)

Non-completed projects. ASAC received concerns regarding the completion rate of programs that require a large number of hours; this seems to be a problem that has been exacerbated by the high oversubscription rate: programs that could not be completed in one cycle are resubmitted but often do not make the cut and the applicants can not publish an unfinished sample. ASAC suggests to look into various solutions suitable for the different programs that may suffer most due to this issue: 1) the introduction of multi-cycle projects (suitable for

extensive programs that do not fit the LP category as well as monitoring programs; see charge 1); 2) a separate category for applicants of unfinished programs.

Permanent Charge #6. Assessment of the scientific impacts of the ALMA Development Program, and particularly of new projects that are proposed.

Recommendations/issues:

- ASAC strongly endorses the project proposal of Data Transmission System (DTS). This DTS proposal develops the digital data links between the digitizers and correlators which are all key components in the ALMA2030 Wideband Sensitivity Upgrade (WSU) roadmap. As described in the proposal, there are some potential risks such as the complexity of the interface with digitizers, which may have an impact on the total budget and scheduling. While the project team is aware of these risks, ASAC recommends the team to proceed with this project under close coordination with the development of other ALMA2030 WSU components.
- ASAC congratulates the team for the progress of the Band-1 receiver development, and is excited to hear the news about the Commissioning and Science Verification (CSV) efforts. Availability of the Band-1 receiver will enhance the scientific significance of ALMA. ASAC strongly endorses the proposal of the Science Verification (SV) campaign.
- ASAC also confirms that the Updated ALMA Science Requirements properly reflect the requirements for the ALMA2030 WSU specification and therefore supports them.
- ASAC is concerned about successive delays of the new OT and the potential impact if its development will run into the timeline of the WSU commissioning. Considering that OT is a crucial tool for an observatory, ASAC hopes the project moves in the right direction and minimizes any negative impact of this delay.

Data Transmission System proposal. ASAC was presented with a development project proposal of the Data Transmission System (DTS). ASAC recognizes that the digital data links between the digitizers and correlators is an essential development element to achieve the ALMA2030 Wideband Sensitivity Upgrade (WSU) roadmap, and endorses the proposal. In addition, ASAC notices the complexity of the interface with digitizers which are also in the prototyping phase. While the project team is aware of such potential risks, ASAC expects the team to proceed with this project under close coordination with the development of other ALMA2030 WSU components in order to avoid any serious impact on the total budget and scheduling.

Band-1 Science Verification. ASAC applauds the team's all efforts in reaching the Band-1 Commissioning and Science Verification (CSV) operation. ASAC is very pleased to hear about the proposal of the Band-1 Science Verification (SV) campaign and strongly endorses this proposal. ASAC asked if there were any Band-1 specific issues in the data processing pipeline and received the response that such issues were being steadily investigated in JAO.

Regional development studies. ASAC received a presentation about the status of regional development studies. Each regional observatory is continuing their efforts to develop the upgraded capability of ALMA and also to offer interfaces for advanced science outputs using ALMA data. ASAC commends these efforts. ASAC hopes that the teams will carefully manage the various potential risks such as the global shortage of semiconductor chips.

New OT development. ASAC is concerned that the development of the next generation OT (ngOT) continues to be delayed. ASAC is concerned about the successive delays and their potential impact if the ngOT will run into the timeline of the early stage of the WSU commissioning. OT is a crucial tool for an observatory and the delay will raise several potential risks for future ALMA operations. ASAC understands that the development team is committed to minimize any negative impact due to this delay, and hopes the project moves in the right direction.

Wideband Sensitivity Upgrade and Updated ALMA Science Requirements. ASAC was given an update on the Wideband Sensitivity Upgrade (WSU) development. It is gratifying to see that the project is proceeding with careful planning managed by a strong Integrated Development Team. This large project includes several challenges in carrying out, and ASAC looks forward to continued good progress. ASAC also confirmed that the Updated ALMA Science Requirements properly reflect the requirements for the ALMA2030 WSU specification.

Ad-hoc Charge 1. The ASAC is charged to identify for the April 2022 board meeting what level of observatory and ARC support is needed to ensure the success of Large Programs, including timely delivery of higher-level data products to the ALMA community. Polling the PIs of more recent LPs is recommended to determine what roadblocks they have faced in completing their projects.

Recommendations/issues:

- The expected period of time for delivery of high-level data products should be relaxed to 24 months from project completion (not completion of each SB) to better reflect the magnitude of the work required to carry out a careful analysis and delivery of high-level data products.
- LPs should provide semi-annual reports on their progress to the observatory including status of data reduction, efforts and funding allocated to the project, and publication

plans. A part of this report should be public-facing and published on the LP webpage to communicate expected results and data products.

- Proposing teams should develop meaningful management plans at proposal time that are evaluated for feasibility against a rubric. These feasibility scores should be available to APRC alongside scientific scores prior to LP selection. Feasibility and broader impact for the community should be considered as part of LP proposal review.
- To incentivize prioritization of LP delivery, ASAC recommends that the PI and co-PIs of LPs should not be allowed to act as a PI of any other ALMA proposals until their LP data are delivered.

PI survey results. ASAC is grateful for the reporting presented by ISOpT based on aggregating information from the PIs of Large Programs. The committee noted about only half of PIs presented any commentary in response to these questions. In reviewing this report and in discussions with ARCs, it does not appear that there is a single set of issues that can be identified and addressed to deliver prompt return of all data. LPs with delivered high-level data noted three factors in their success: (1) having access to a central data and computing infrastructure where multiple people could work on data and analysis, (2) having successful funding requests to provide personnel support, and (3) having good support from the ARCs. Several PIs and ALMA staff noted that the effort required for completing an LP was not well understood at proposal time and the projects took longer than expected. ASAC was concerned that the ARC managers had reported only minimal contact with some LPs.

ASAC notes that the actual contribution of LP data products to the archive does not appear to be a challenging process and teams reported good interaction with the ARCs at this stage of the process. The delays to delivery appear to come before this final step and may reflect both technical challenges and a lack of prioritization of this commitment to the community.

Related to this charge, ASAC discussed how LPs impact the remainder of ALMA science, which we discuss in our response to Charge 4.

ALMA makes a large commitment of resources to the LPs, and the community has borne the associated opportunity cost of the tens of highly ranked programs that could not be scheduled because of this commitment. It is imperative that successful LP teams prioritize dedicating effort to developing results and returning data back to the community. ASAC recommends that ALMA develop a stronger set of reporting and obligations around LPs to better communicate the importance of these commitments.

ASAC recognizes that high-level data ingest within 12 months of LP project completion is challenging for many teams for a range of factors. We propose relaxing this timeline to 24 months but making it a stronger expectation that delivery happens before this deadline. To ensure that ARCs and the communities are aware of project timelines and outcomes, ASAC

recommends that LP teams be obligated to provide reporting on project status to the ARCs and general summaries to the public. This practice is implemented at several other observatories (GBO, VLA, JCMT, IRAM).

ASAC also notes that LPs are not evaluated based on their capacity to complete the project and the management plan is not materially used in the evaluation of programs. Given the commitment of resources, ASAC believes that feasibility and the utility of the public data products should be included in the criteria for LP review. In particular, ASAC recommends that the management plan of an LP proposal be expanded in scope (recommended two pages). The proposal should include specific headings and topics that needs to be addressed including available or planned personnel, software support, a clear computing plan that demonstrates awareness of the needs for the LP, and established communication channels with the ARCs. ASAC recommends that the management plans be evaluated and scored against a rubric for feasibility and that these scores be provided to the APRC at the same time as science panel scores. ASAC recognizes that these management plans are not necessarily accurate but strongly believes that the planning process itself will help refine proposals. Such refinement will help APRC in selecting the proposals that will be both impactful and successful in meeting their commitments to the community.

Finally, to communicate the importance of LP delivery, ASAC recommends that the PIs and co-PIs of LPs not be allowed to propose further ALMA projects as PIs until the delivery of their high-level data products. LPs should be one of the highest priorities for the leadership of a project and such a restriction will emphasize the importance of these projects. A similar policy is already in place at IRAM and is often cited as a reason to prioritize delivery and publication.

Ad-hoc Charge 2. The ASAC is charged to advise the Board on ways to implement a scientifically beneficial, equitable, and fair use of Director's Discretionary Time on a dedicated campaign (project or projects) that will demonstrate the uniqueness and power of ALMA's high-frequency capabilities by providing high quality data products to the community. Namely, the ASAC should consider where this approach is warranted and if so how such projects should be conceived, completed, and selected to maximize both partner participation and overall impact in a reasonably short execution time frame.

Recommendations/issues:

- ASAC agrees on the importance of increasing the number of high-frequency projects carried out with ALMA.
- ASAC praises JAO for their preliminary analysis of the causes for a low completion rate of high-frequency projects.
- ASAC supports taking additional measures to increase the completion rate of normal high frequency projects prior to considering other proposal methods to promote these projects.

- In particular, ASAC supports new measures put forward by JAO to increase the number of high frequency projects completed by increasing their scheduling priority at the telescope via changes in the appropriate KPIs and by explicitly promoting high-frequency projects to the community and educating observers on how to optimize the combination of LST range and configuration to maximize the likelihood of completion. ASAC also suggests allowing high-frequency, high-priority projects to carry over an extra cycle if they have not been completed.

A long-standing issue. The low number of high-frequency observations carried out with ALMA has been a historical concern. A number of attempts to increase this number has been made over the years, but unfortunately they have all met with little success. Since the problem persists, further attempts to increase the number of successful high frequency observations are required, and ASAC welcomes the Board suggestion of using DDT time as an interesting option worth exploring. To study its convenience, ASAC discussed with JAO members some of the difficulties that high-frequency projects encounter as they are rated, scheduled, and carried out at the telescope.

Low completion rate. A first point to note is that the JAO data shows that the community continues to submit high-frequency proposals, and that the reviewers do not discriminate against them. In the current Cycle 9, for example, Band 9 proposals presented the best overall rank among all bands, while Band 10 presented the worst (Carpenter et al. 2022). This indicates that reviewers do not see the choice of band as a main consideration in their rating of a proposal. The low number of successful high frequency projects carried out by ALMA seems therefore to lie in the difficulty of completing them at the telescope.

JAO analysis. While discussing the completion of high frequency projects, ASAC learned that JAO is working on a detailed analysis of this issue, and it was briefly shown a document containing some preliminary findings. According to this analysis, there are a number of factors that contribute against the success of high-frequency observations. Some factors are internal to the functioning of the telescope, such as the lack of Key Performance Indicators (KPIs) specific to high frequency observations. Current KPIs encourage observing efficiency and QA0 pass hours, indirectly favoring the scheduling of Band 3 and 6 projects.

Scheduling difficulties. Another element that contributes to the low completion of the high-frequency observations is the small number of projects that are scheduled during each cycle. It often occurs that when high-frequency weather is available, no high-rated high-frequency project can be found for the current combination of LST range and array configuration. This issue may be ameliorated by promoting high-frequency C rated projects, which otherwise are unlikely to be observed, a measure already implemented in Cycle 9. It may also benefit from encouraging observers to submit more high-frequency projects with a variety of LST ranges, which has not been explicitly done before Cycle 9. JAO also informed ASAC that proposers often request combinations of antenna configuration and LST range that are poorly suited for the success of the high-frequency observations, despite the information provided in the Proposer's Guide. There is a feeling that the community is not aware of the factors that contribute to the completion of a high-frequency project, and that the details may be buried in

parts of the Proposers Guide that are not consulted by the observers. Better educating the community (e.g., with specific tutorials for optimizing high-frequency observations) could ensure that projects are optimized for having a high chance of being completed. This could be reinforced if future versions of the OT inform the proposer of the estimated probability that a particular high-frequency setup may be completed at the telescope, and if low, it recommends the proposer to seek technical assistance.

Recommendations. As James Di Francesco explained, the rationale for suggesting the use of DDT to promote high frequency observations is that these projects are conferred the highest priority at the telescope, which may improve their rate of completion. The previous discussion, and the more detailed analysis by JAO, shows that in fact much can still be done to increase the efficiency of observations using the standard route of normal proposals. For this reason, ASAC recommends exploring first the effect of a number of measures (some of them recently implemented) that promote completion of high frequency projects before considering the DDT option. In particular, ASAC supports the new measure of promoting the scheduling of high-frequency projects at the telescope by changing the appropriate KPIs and even giving priority to C-rated projects. ASAC also supports explicitly promoting high frequency projects to the observers, and providing simple tips on how to select the combination of LST range and configuration that most likely will get the project completed. Finally, ASAC suggests considering the possibility of adding an extra year to the time that a high-priority high frequency project can stay in the queue if is not observed because of bad weather.