

ALMA Board response to the ASAC Report of January 2006 meeting

The Board thanks the ALMA Scientific Advisory Committee for the report with its recommendations arising from their deliberations during their January 28-29 meeting at the University of Maryland. It is grateful to the ASAC Chair, Dr Christine Wilson for her clear, succinct, and directed report and for her effective participation in the discussions that followed.

As part of the process of improving its effectiveness the Board requested that formal reports such as those from ASAC be transmitted to the Board accompanied by a JAO response stating clearly their advice regarding each recommendation. The process is meant to ensure that the Board has thoughtful, complete information in advance of the meeting at which the ASAC report is considered to inform its decisions. The Board is grateful that Interim Project Scientist Tom Wilson, with the Director's concurrence, provided the first such report during the Kyoto meeting, and looks forward to receiving more detailed JAO responses well in advance of future Board meetings.

The summary of the Board's response to ASAC's report is detailed below, taking account of the comments in response by the JAO.

Charge 1: *Review progress in the science software development for ALMA (e.g. plans for the observing tools, pipeline system and archive) and how they will meet the top level user requirements.*

The Board notes that the ASAC strongly supports the decision to make use of the ESO experience with data base software, infrastructure and bulk data handling. However, the Board notes with concern ASAC's observation that "the ALMA science archive, which will be the main interface to the archive for an outside user, is still in a pre-development phase with the requirements and design documents still in draft form." Because of the importance of the ALMA archive to users, the Board requests that the JAO report back for the June, 2006 Board meeting on the steps being implemented to address ASAC's concerns, including finalization of the requirements and design documents.

The Board finds ASAC's comments on the progress of the off-line software very helpful. The Board endorses ASAC's Recommendation 5 "that the commissioning team be fully committed to using the ALMA science software during commission." It fully agrees with the importance of testing the new CASA package, to be released in 2007, against other systems. The Board is grateful for the in-kind contributions by ASAC members and other scientists to SSR activities, including CASA testing. It also sympathizes with the JAO response that the software testing will be done by the computing support group under the operations budget, but notes that it is imperative that independent tests be conducted in a timely manner within the community. The Board suggests that the burgeoning ARCs and their scientific staff could be another important, funded group to participate in this task (Recommendation 6). As the ASAC notes, it is imperative that the CASA software be adopted by the community and that the project must avoid fall-back use of earlier software by making the off-line package user-friendly (Recommendation 4). At an appropriate time, the Board will ask ASAC to assess further progress in this area.

Finally, the Board will press the project to ensure that the pipeline development is timely and that this facility is available for early ALMA observations (Recommendation 6).

Charge 2: Review the plans and progress towards the scientific integration of the ACA into the baseline ALMA project, e.g. software and calibration issues.

The Board was pleased to learn of the substantial progress by the ALMA-J team on detailed planning of calibration and operations concepts, and appreciates ASAC's thoughtful formulation of new definitions to clarify calibration accuracy requirements, which merit adoption by ALMA.

The Board notes the ASAC's concern that "the current ACA expectation for the absolute flux calibration is 5%.... with a 5% calibration uncertainty between the two data sets (i.e. ACA, 12 m arrays), such images would be effectively limited to an image fidelity of 20:1." It also appreciates that "higher accuracy may be possible with cross correlation between the two arrays but that such cross calibration will require a complex and carefully coordinated sequence of observations to be executed by the two arrays." ALMA's Acting Project Scientist advises that the Science IPT is working on the problem and the Board encourages them to find schemes to lower the relative calibration errors of the two arrays without delay, but stresses that the solutions to this issue should add as little complexity as possible. Furthermore, the Board will ask the ASAC, in a further charge, to look into calibration plans in general.

The Board notes ASAC's view that "the priority of the ACA must be to provide short spacing information to be combined with data from the 12m array," and concurs that the possibility of operation in the combined mode should not be designed out of the baseline.

Additionally, the Board shares ASAC's worries about the observing technique of chopping during on-the-fly scanning of the total power antennas and its effect on data quality (smoothing the TP data). This technique and its usefulness should be studied by the science IPT without delay (Recommendation 8). Finally, the Board concurs with ASAC's Recommendation 10 that the DRSP be updated with new projects for Bands 4,8, and 10, as well as more detailed information relating to the ACA. It encourages the Science IPT to do this no later than the end of 2006.

Charge 3: Review the existing analysis of the polarization and mosaicing performance of the hybrid ALMA array and consider the priority and timescale for further analysis by the science IPT.

The Board is grateful for the ASAC advice on these difficult but important problems and concurs with Recommendation 1 that the project should, with some urgency, consider the final optimization of the two 12m antenna designs with respect to the shape of the feed legs and the possibility to tilt the sub-reflector in order to maximize the sensitivity of the array. It cautions with JAO concurrence, however, that it is too late to make major changes without incurring unacceptably large cost penalties.

With regard to the exact electromagnetic performance of the two antennas and the effects of differences on polarisation and sidelobe performance which may be deleterious to mosaicing image fidelity, the Board agrees that studies must be performed

(Recommendation 2). It understands that such a study has recently been commissioned by ESO.

Regarding Recommendation 3, that the science IPT continue to work on solutions to the potential wide field mosaicing and polarization problems posed by different antennas, the Board is pleased to note that this is being addressed by a postdoc, hired recently by NRAO.

The Board has reacted to the ASAC's worries (Recommendation 11) about the need for a serious, integrated outreach programme to "ensure that ALMA has a single public face" by asking the JAO to present plans for such a programme to the Board's June meeting.

More broadly, during informal discussions in Kyoto Board members acknowledged the critical importance of ASAC in effective ALMA communications within the community of professional astronomers, in at least two ways over and above the formal reports. First, whenever opportunities arise with professional colleagues ASAC and Board members alike need to share accurately their excellent, detailed understanding of ALMA developments and the efforts being made by the partnership to deliver this ambitious, complex, pioneering facility. Second, both ASAC and Board members need to promptly and effectively correct misinformation arising within the professional community that comes to any member's attention. Sharing an enormous stake in ALMA's success, we all have a responsibility to ensure that astronomers worldwide are well and accurately informed.

Once again, the Board is sincerely grateful to the ASAC for their hard work in carrying out their charge. We thank Christine Wilson for her work as chair and congratulate her on an excellent presentation of the ASAC report, and look forward to working with John Richer as the next ASAC Chair. We request that future ASAC presentations include some brief material with recent science results (for example, as relevant to the ASAC charges).