CRC Report for CHANCO for ALMA Cycle 4

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Executive Summary

In the view of the CRC, Chile participates in the international process on equal footing with other executives, with few obvious biases, and Chilean requests to ALMA are being followed. During the ALMA Cycle 4 review process, the CRC and its chair carried out all duties required of them, including the evaluation for the second time of the Chilean (CL) eligibility status. This evaluation went relatively smoothly and resulted in the removal of one CL proposal and discussion of several others within the context of “Palo Blanco” and past usage; under the current rules, only a handful of PIs were eligible for the past usage evaluation. The CRC feels that the evaluation of CL proposals was much smoother than cycle 3. Nonetheless, a few recommendations for cycle 5 are:

1. First and foremost, CONICYT and Universidad de Chile should create formal documentation specifying the tasks of the CRC, signed by the proper authorities of those institutions and made public. Moreover, all documentation regarding Chile’s involvement in ALMA should continue to be made public and posted (e.g., on the current ALMA CRC page);
2. The CRC should continue to evaluate Chilean eligibility and work plans under the current structure. Some minor modifications on which programs are evaluated for past usage could be made. The deadline could be shifted to 2 days after the formal ALMA deadline.
3. The CRC submission process should be migrated to an online form to allow more features and flexibility, while minimizing the amount of work for the proposers.
4. SOCHIAS should establish very clear definitions of the different categories of proposer and how each one can apply for ALMA time, so the CRC need not have to define or interpret it themselves.
5. CONICYT and Universidad de Chile should clarify rules on how conflicts of interests and confidentiality are determined and dealt with.

Compared to past cycles, duplications and descoping were handled much better by ALMA. Due to the inclusion of Chile’s contribution to the grade A ranked large programs, CL’s fraction of grade A was also proportional to its fair share. ALMA decided not to balance grade C proposals in proportion to regional shares, although the net result (the observed programs) must be balanced by definition; it remains unclear how this affects the cycle 4 observing statistics for CL.

Full Report

1. Background/Introduction.|The Chilean share of time on the Atacama Large Millimeter/Sub-Millimeter Array (ALMA) is administered by CONICYT and the Universidad de Chile. The time allocation has been entrusted for the first four cycles to an international proposal review process run by the Joint ALMA Observatory (JAO) and in which Chile (CL) participates along with the other three executives: North America (NA), Europe (EU) and East Asia (EA). In what follows we briefly summarize the proposal review process. We have borrowed text in what follows from the “Guidelines for Science Assessors" document distributed by ALMA to the participants of the review process for Cycle 4.

Cycle 4 proposals could be of one of the following types:

- **Regular Proposals**, which refer to observations that can be fully specified by the regular proposal submission deadline and whose estimated execution time does not exceed 50 hours on the 12-m Array or on the ACA in standalone mode.
- **ToO Proposals**, which should be submitted to observe targets that can be anticipated but not specified in detail.
- **Large Programs** (LPs), whose estimated execution time is greater than 50 hours on the 12-m Array or on the ACA in standalone mode. New to Cycle 4, LPs in particular should address strategic scientific issues leading to “transformative” breakthroughs in respective fields.
- **mm-VLBI Proposals**, to be made in concert with the Global Millimeter VLBI Array or the new NRAO/Event Horizon Telescope Consortium.
- **DDT Proposals**, which can be submitted during Cycle 4.

Proposals to observe using the ACA in a stand-alone capacity for short baseline interferometry and single-dish observations were now accepted. Standard and non-standard mode observations were introduced in the ALMA scientific operations in Cycle 3. The fraction of the available observing time to be dedicated to non-standard mode observations is restricted to 20%.

Proposals were reviewed in one of 18 ALMA Review Panels (ARPs), each of which was composed of eight Science Assessors, including a Chair and a Deputy Chair. Fourteen (14) Science Assessors were invited to participate from Chile, spread out amongst the 18 ARPs, who by virtue of participating in an ARP also become members of the Chilean Review Committee (CRC). In late 2014, the Chanco nominated Franz Bauer to act as chair of the CRC and the nomination was accepted by the Universidad de Chile. Two Chilean panelists acted as Chairs of their respective Cycle 4 ARPs: Franz Bauer was Chair of an ARP in Science Category 1 and Diego Mardones was Chair of an ARP in Science Category 3.

The Science Assessors were instructed to evaluate proposals solely on their scientific merit. As in previous cycles, the proposals for cycle 4 were separated into five science categories:

1. Cosmology and the high redshift universe
2. Galaxies and galactic nuclei
3. ISM, star formation and astrochemistry
4. Circumstellar disks, exoplanets and the solar system
5. Stellar evolution and the Sun

The combined expertise of the Science Assessors for each panel was intended to cover the range of topics relevant to the scientific category of that panel. There were four ARPs assembled for each of categories 1, 2, 3, and 4, and two ARPs for category 5.

Science assessments were made in two stages. In Stage 1, each proposal was evaluated by all Assessors of the ARP to which it was assigned, with one assigned as Primary. Based on the resulting ranking, roughly ~75% of the proposals proceeded to Stage 2, where they were reviewed and discussed face-to-face by all members of the relevant ARP. The proposals discarded at stage 1 were considered “Triaged" proposals.

Prior to the scientific evaluation, the CRC screened submitted Chilean proposals for Chilean eligibility status based on a set of eligibility and usage rules. These rules were published on the CRC website (http://www.das.uchile.cl/das_alma_crc.html) and linked to from the Cycle 4 Call for Proposals. By agreement with ALMA authorities, this evaluation must occur before the commencement of Stage 1, in the first 2.5 weeks following proposal submission. The eligibility requirements for cycle 4 were:

1. The PI must be affiliated with a Chilean Institution and reside in Chile. This residency should substantially overlap ($\gtrsim$ 6 months) with the observing period of ALMA cycle 4. Residency will be determined by comparing the list of proposers against the "Lista Blanca" maintained by the Sociedad Chilena de Astronomia (SOCHIAS). Proposers must ensure that their department head puts them on this list before the Cycle 4 proposal deadline;
2. The proposal must have at least one permanent Chilean faculty member among the proposers (PI or co-I);
3. Student-led proposals require a support letter provided by their supervisor;
4. The PI must submit a single report on past ALMA usage through the Chilean partner time, summarizing the analysis and publication status from all previously observed ALMA programs as PI, with emphasis on Chilean participation. The rough expectation is that PIs should publish at least one Chilean-led (faculty, postdoc, or student) paper associated with roughly 50% of their completed projects for which the data have been public for >1 year (max. 1/2 page per project). If the PI has no past usage through the Chilean partner time, then this section can be left blank;
5. The PI must submit a single work plan highlighting, for each submitted proposal, who will do what with respect to reduction, analysis, and paper writing, with particular emphasis on the role of the Chilean PI and co-Is. The rough expectation is that the Chilean PI/co-Is should have a strong role within the project and contribute to the growth of submm/mm astronomy within the Chilean community (max. 1/2 page for each proposal);
6. If the proposal is rejected on any of the above grounds, the PI will be notified and given the opportunity to appeal the CRC decision within the next 7 days (inclusive). PIs should note that this is an opportunity to dispute misinterpretations of submitted documents, and not a second chance to provide missing documents.

To assess requirements 1 and 2, the CRC chair used the SOCHIAS lista blanca. Documents for requirements 3-5 were submitted on April 22, 2016, one complete day after the Cycle 4 proposal deadline of April 21, 2016. In addition to the link in the ALMA call for proposals, an announcement about this process was made to all SOCHIAS members on Apr. 4, 2016. Several PIs failed to submit forms by the deadline, and reminders were issued to those PIs. The CRC convened a face-to-face meeting on May 2, 2016 to assess all of the information, and determine which proposals, if any, failed to meet the eligibility requirements (see section 2 below). This information was communicated to the relevant PIs and to the ALMA authorities.

For Stage 1, each proposal was assigned a score from 1 (best) to 10 (worst) by four Science Assessors. Once all Stage 1 reviews have been completed, the scores assigned by individual assessors to non-Large proposals were normalized to the same mean and the same standard deviation, from which an average was computed. A single ranked list of all proposals was built and a “triage” line drawn. Only proposals above that line were considered in the subsequent stages of the review process, as were proposals for which the standard deviation of the individual Stage 1 scores exceeds twice the value adopted for normalization. Large Proposals will not be subject to triage. Triaged proposals could be resurrected (i.e., marked to be discussed in Stage 2) by any ARP member that did not have a conflict of interest, pending a good reason is given and approved by the APRC Chair. In addition, the guidelines for the triage process state that “ensuring that the estimated 12-m Array time required for execution of the proposals that proceed to Stage 2 is not less for any region than thrice [3x] its nominal share of the Cycle 4 available time." An initial technical evaluation was also made internally by ALMA staff during Stage 1 for the fraction of the proposals which were historically the most likely ones to have issues. Technical evaluations were provided to the Science Assessors in Stage 2.

For Stage 2, all Science Assessors met in Vienna, Austria during the week of June 19-24, 2016 to discuss the proposals in person. Each proposal was discussed by one ARP and reranked between 1-10. Separate sessions were held to evaluate all Large Programs (LPs) in a given category, with each session comprised from the unconflicted members of two ARPs in a given Category (this allowed each LP to be evaluated twice); each LP panel could put forward at most one LP (or none). The rankings made in the ARPs and LP sessions were collated by the ALMA Proposal Review Committee (APRC), which dealt with duplications and reviewed all recommendations made by the ARPs in order to produce a single ranked list of all proposals. The chair of each ARP served on the APRC, along with the chair of the CRC as the Chilean representative and the APRC chair, who was not affiliated with any ARP but oversaw the entire process along with the ALMA director Pierre Cox and review organizer Gautier Mathys. A second special session amongst the unconflicted APRC members was held to merge and evaluate all LPs put forward from the first LP sessions. The APRC made a final set of recommendations to the Joint ALMA Observatory, which then was concurred by the Director's Council and the chair of the CRC as the Chilean representative. Proposals that may potentially be observed by ALMA during Cycle 4 were assigned priority grades of ‘A’, ‘B’ or ‘C’, while those that will not be observed were designated with a ‘U’. Grade A was reserved for the top third (33%) of proposals by rank; this grade makes these proposals eligible to be carried over to

Cycle 5 if they cannot be successfully completed in Cycle 4. *As yet, no firm rule is in place to equitably distribute Grade A proposals amongst the partners*. Grade B proposals are high-priority proposals, of which ~90% are estimated to be successfully observed by the end of Cycle 4. Grade C proposals correspond to the so-called “filler" programs, to be observed if conditions are such that no A or B proposals can be observed; these proposals were assigned based on rank and to account for over/underrepresented RA ranges and bands which are traditionally more likely to be observed (e.g., bands 3-6). Proposal grades were assigned based on scientific rank from the APRC, executive balance (only for grades A+B), and scheduling feasibility. The latter was taken into account for the first time in Cycle 4 to avoid oversubscribing configurations and LST ranges. To that effect, a Monte Carlo simulation was run following the face-to-face APRC meeting to assess the probability that a project could be completed based on the configuration schedule, the proposal pressure as a function of configuration and time of day, the frequency of the proposed observations, and the variations in the historical weather patterns.

2) Analysis of Review Process for Chilean Proposals. In what follows, we present some statistics pertaining to all proposals, with an emphasis on CL proposals. The CRC would like to thank ALMA for sharing the full list of grades with the CRC chair and responding to various CRC-related requests about fairness throughout the evaluation process, which allowed the CRC to assess the fate of Chilean proposals at every stage of the process.

2.1) Overall Statistics. For Cycle 4, 3000 12-m hrs and ~3000 ACA hrs are expected to be available, for which 1571 unique proposals requesting 12015 total 12-m hrs and 6345 total ACA hrs were received and reviewed. These included 27 Large Proposals, 22 mm-VLBI proposals, 21 ToO proposals, and 1501 Standard Proposals. The overall oversubscription rate for the 12-m array was thus 4.0, although it should be noted that a non-negligible fraction of the submitted proposals were resubmissions of uncompleted Cycle 3 programs, the bulk of which are expected to be completed before the end of Cycle 3. Broken down by Executive, there were 111 proposals for 916.6 12-m hrs from CL PIs, 355 proposals for 2564.8 12-m hrs from EA PIs, 448 proposals for 3521.0 12-m hrs from NA PIs, 673 proposals for 4785.6 12-m hrs from EU PIs, and 45 proposals for 275 12-m hrs from non-partner PIs. The full list of CL proposals, including titles, proposals identifiers, list of co-investigators, and abstracts, is included as an accompanying file to this report. Proposal submission by CL institution was as follows:

Universidad de Chile (45 proposals, including 1 from the UMI and 5 from the CCJCA),
Pontificia Universidad Católica de Chile (24 proposals),
Universidad de Valparaíso (20 proposals),
Universidad Diego Portales (11 proposals),
Universidad de Concepción (9 proposals),
Universidad Católica del Norte (2 proposals),
Universidad Nacional Andrés Bello (1 proposals),
Universidad de Antofagasta (1 proposals),
Universidad de Atacama (1 proposal), and
Universidad Austral de Chile (1 proposal).

2.2) Chilean Eligibility Stage. The CRC evaluated all eligibility information received by May 2, 2016 during a face-to-face meeting at Cerro Calan. Twelve members in attendance (Lira and Kimeswenger absent).

Eleven (11) out of 66 proposers submitted their reports late, with a disturbing number of late reports (3) coming from CRC members. A motion that the CRC should accept these forms was made and passed (7-2), with participation only from those CRC members who submitted proposals on time. Most CRC members were in favor of stricter enforcement in Cycle 5 to avoid such issues.

CRC requirements 1 and 2 were evaluated using the SOCHIAS Lista Blanca. The Lista Blanca made the process considerably faster and smoother than cycle 3, although some information like eligibility dates was lacking for some PIs and revised information had to be requested for several proposers. Incomplete or incorrect information should be remedied and homogenized by SOCHIAS for future cycles. Two outstanding cases were discussed. The CRC granted one-time exceptions in cycle 4 to both cases and has enlisted SOCHIAS to revise and clarify the rules regarding for such ‘grey area’ situations (adjunct status, foreign-based PhD students, etc.). One case further highlighted an issue that the CRC had failed to address in the rules, namely whether only permanent faculty should be able to apply as co-PIs of large programs or if this should instead be based on number of hours?

CRC requirements 3, 4 and 5 were evaluated based on the information submitted via the CRC latex form. One issue that arose after the deadline was the realization that embedded within the commented latex instructions was a statement to describe only the past 3 cycles of usage (i.e., not cycle 0); this conflicted with the requirement to describe all usage as stated on the website and led to a few omissions. Some leniency was granted on the part of the CRC here and in the few cases when further information was critically needed, the CRC requested it. Eight individual PIs were discussed based on work plan or past usage 'issues', from which three proposals were subsequently rejected.

Another item discussed in some detail was in regard to the 10 Chilean PIs who applied for >~10% of the Chilean time (30 hrs) in aggregate amongst their submitted proposals. With the manner in which shares of LPs were distributed among co-PIs in cycle 4, this meant many Chilean co-PIs fell into this category. While the use of >10% of the Chilean allocation was a concern in early cycles, where time was limited, it was ultimately not considered as critical now among the CRC members. In particular, several CRC members argued that enforcing such a restriction would likely limit cutting edge proposals from Chileans. Any rules on this should be more fully developed and made clear before proposal submission, with the evaluation taking into account the list of collaborators and work plan. Nonetheless, a brief discussion for the above cases occurred based on the work plans. In future cycles, the CRC felt that any LPs requesting substantial amounts of Chilean time should have broad impact with the community.

A few further issues were brought up during the face-to-face subsequent email discussions:

- With regard to past usage, a major concern is how to know what the ultimate status of the data is (ALMA as yet does not publically report completion fractions, so the CRC must naively assume 100% unless the PI explicitly indicates otherwise).
- There was discussion surrounding the strictness of requirement 4. A few CRC members argued in favor of removing any strict rule on publications and instead evaluating proposals on a case by case basis. Others, however, argued that without such rules the evaluations would be far too subjective and difficult to justify. Still others argued for a modification of the rule in cycle 5 to incorporate Poisson errors due to anticipated dispersion.
- Further improvements to the CRC evaluation process. Most fundamental would be to establish an online submission interface similar to that of the CNTAC in 2016B. Features would ideally include automatic checking against Lista Blanca, flexibility to allow variable text entries, automatic listing of past programs to report on, ability for co-I sponsors and student advisors to sign onto each program, ability to save and retrieve entries from current and past cycles. Additionally, a better description of what the CRC is looking for in the work plan would also help. And finally, to capture past usage information on programs where the PI is no longer in Chile (e.g., postdocs, students, visitors) and enforce that co-I sponsors are responsible for the programs they sign on to, it would be valuable to force co-I sponsors to provide short past usage reports for all programs they sponsor.

Unlike in cycles 0 through 3, most members of the CRC finally felt that they had sufficient information to evaluate and act on concerns about past usage and work plans.

2.3) Stage 1 (Triage). In Stage 1, 454 proposals in total were triaged, broken down by Executive as 1 CL, 124 EA, 180 EU, 98 NA and 17 non-partner. Of the triaged proposals, 34 were afterwards resurrected, resulting in an overall triage percentage of ~27% both by number and hours. In addition, 6 proposals, broken down by Executive as 1 CL, 1 EA, 2 EU, 2 NA, and 0 non-partner, were deemed infeasible based on the rules laid out in the ALMA Proposer's Guide for the perceived capabilities and performance of the ALMA Observatory. Thus <1% of CL proposals were respectively triaged and deemed infeasible. The fraction of infeasible proposals appears a bit high compared to the other partners, but no obvious biases were found among the review assessments at least.

2.4) Stage 2. A total of 402 proposals were given priority grades A or B, adding up to a total 12m observing time of 3000 hrs. There were 135 Grade A proposals, of which 10 were Chilean, comprising ~40.7% of Chilean time. This can be compared to 36.8% for EU, 40.7% for NA, 12.8% for EA, and 40.1% for non-partner ("Open Skies"). Grade A proposals were assigned based solely on rank and scheduling constraints, and not adjusted for regional balance; cycle 4 marks the first time Chile has received its fair share of grade A proposals, although this is highly

biased by the Chilean shares of the two approved LPs, which provide the majority of grade A time (i.e., only 18.9% of Chilean time for eight no-LP grade A proposals).

As in previous cycles, the ranks of Chilean proposals were skewed toward lower values than the other partners. Prior to the scheduling simulations and excluding LPs, the Chilean proposals went about 1.6, 1.6, and 1.3 times deeper into the ranked pool of proposals than the EU, NA, and EA partners to fulfill their full allocations (in terms of 12-m hours for grades A+B). These factors have improved significantly compared to cycle 3, where CL proposals went 2.1, 1.9, and 1.2 times deeper, respectively, although this is again largely due to the approved LPs with grade A. The total 12-m array number and time of the CL A+B proposals is 39 proposals for 285.3 hrs (out of 300 hrs nominally), plus 98.1 hrs of 7-m array time (out of 300 hrs nominally) and 18.3 hrs of non-standard mode time (out of 60 hrs nominally). A total of 211 proposals were assigned grade C, for 1160 hrs of 12-m array time. Of those, 17 proposals were from CL, for a total of 104.4 hrs of 12-m array time.

During the stage 2 process, the CRC chair polled each CRC member to assess the presence of regional biases within any particular panel. As opposed to past cycles, none were observed; this is likely due in part to the extra efforts ALMA is made in cycle 4 to bring up bias potential prior to the start of the review process. The CRC applauds ALMA for taking this initiative.

2.5) APRC Meeting. The APRC meeting was held on June 23-24, 2016. In attendance from CL were Franz Bauer, in his capacities as the ARP1D panel chair and the CRC chair, Diego Mardones, by virtue of being the ARP3A panel Chair. Additionally, because both Bauer and Mardones were conflicted for evaluating Large Projects, Paulina Lira sat in for all LP discussions. By design, each ARP had a similar fraction of proposals in terms of numbers and hours, and thus ALMA merged the ranked lists from each ARP in consecutive order. Given that a substantial fraction of the top ranked proposals were resubmissions, it was noted (for the second year in a row by the CRC chair) that to be completely fair between the different ARPs, the final proposal ranks should be done only after pulling out all of the completed Cycle 3 projects in October 2016. Presently, the scheduling simulations accounted for the removal of resubmissions only through the end of July, and it remains very unclear what the trickle-down effects on the viability of the any proposals currently deemed unschedulable would be if ALMA removed observed resubmissions through October before recalculating ranks. Note that the lowest ~30% of CL proposals were strongly affected by the scheduling simulations (such differences were seen over all regions).

Due to the new duplication policy rules in place for cycle 4, the process of dealing with duplications was considerably streamlined. The number of duplications was reduced by a large factor and was largely dealt with between ARP Chairs prior to the APRC meeting. Thus the APRC did not deal with duplications as in previous cycles.

On the other hand, cycle 4 marked the first time that LPs were evaluated, and the APRC spent a considerable amount of time assessing these. After evaluating all 27 LPs submitted, the APRC recommended that only the top two LPs be scheduled after considering both the scientific rank and scheduling feasibility. The first LP (2016.1.00324.L, P.I. Fabian Walter, with Chilean co-PI Aravena) will trace the cosmic evolution of cool gas and dust by conducting an unparalleled deep spectroscopic and continuum survey of the Hubble Ultra Deep Field. The second LP (2016.1.00484.L, P.I. Sean Andrews, with Chilean co-PI Perez) will provide a first comprehensive census of the diversity of structures (e.g., gaps, rings, spirals, clumps) present in young protoplanetary disks by surveying 20 disks at an angular resolution comparable to the HL Tau image.

In cycle 4, science categories 1 and 4 accounted for the majority of the CL time.

2.6) Director's Council "Meeting".| The Director's Council and the Chilean representative discussed the final list of graded proposals from the JAO via email during Aug 1-6, 2016. The JAO version of the grades differed substantially by about 30% from the APRC ranked list due to the scheduling simulations that were conducted and in a few cases assigned grace C proposals down to the triage line. In the first version of the JAO list, the balance among A+B grade proposals was as expected but C grades were chosen based on rank and schedulability only, with no regional balance in mind. This strongly favored EU and NA proposals in the composition of the C grade filler pool, at the expense of EA and (to a lesser extent) CL. The representatives from EA and CL vetoed this version, and a second version was produced with a more equitable balance among C grade proposal. EU vetoed this second version because EU had fewer C grade proposals now and it was claimed that several young female proposers would be adversely affected. NA vetoed this second version because it was claimed to be a less efficient use of ALMA. To avoid lengthy delays, ALMA reverted to the first version with the addition of a few more grade C proposals for EA. EA accepted this version. CL did not initially accept this version, and asked that more CL proposals also be included. ALMA insisted that CL accept this version for fear that EU or NA would veto and cause lengthy delays, and pressured the CL representative to reluctantly accept it. ALMA argued that the C grade filler pool did not need to be strictly balanced, as balancing will already be done at the A+B grade level on a monthly basis. The CL representative argued that a weak filler pool in combination with imperfect weather might lead to weaker CL proposals getting observed.

The CL representative also complained that the 15% LP limit was exceeded for the CL time (LPs made up 22% of A+B grade CL programs); ALMA argued that the 15% limit was only with respect to the overall time, and that the CfP did not explicitly limit fractions for each regional share.

Both issues should be advocated for at the board level for cycle 5. To bolster this case, it is important that ALMA publish sufficient statistics to demonstrate the division of time in cycles 0,

1, and 2 has been equitable (in terms of completed programs as a function of RA, band, configuration, PWV, etc).

3) Report on the Chilean Review Committee Tasks. The CRC would like to point out that ALMA has been observing for five years now and yet there still no formal documentation specifying the tasks of the CRC. All that exists is an informal record of an agreement between CONICYT and Universidad de Chile, which has still not been signed by any authority of those institutions and is not publicly available anywhere, at least to the knowledge of the CRC. At least the document entitled “Proposal for Chilean participation in ALMA" and the annual reports by the ad hoc advisory committee “Chanco” and the CRC were made public in March 2016.

Based on recommendations from the CRC in Cycles 2 and 3, the Cycle 4 CRC worked with the director of the DAS of Universidad of Chile to augment the series of rules to evaluate the eligibility of Chilean PIs in Cycle 4. Nearly all of the Cycle 4 CRC members feel that this latest set of rules now provide the CRC with sufficient information and flexibility to properly evaluate the expertise and productivity of CL PIs based on their previous publication and ALMA record, on the number and expertise of the Chilean Co-Is, on the involvement of graduate students, and availability of local resources to judge the impact in Chile of proposals qualifying for Chilean time. In justified cases the CRC should have the authorization and ability to recommend limiting a CL PIs time allocation or disallowing the proposal or the PI from being eligible for Chilean status altogether. There were a handful of cases where detailed work plans helped to clarify the roles played by the Chilean and non-Chilean members on certain programs, and now provide a written record of these roles that could be compared to past usage information in the subsequent years. The CRC estimates that perhaps as many as 5%-10% of proposals were cases where the CL PI fronted a proposal for a foreign group and where the level of significant Chilean involvement remained unclear or quite limited. The clearest and most dangerous cases concern the LPs, particularly since ALMA failed to impose the 15% limit at the regional partner level. Moreover, while “palo blanco" proposals may not comprise a large fraction of the total proposals, they do constitute unloyal competition to colleagues who are making a sincere effort to carry out science with ALMA and thus reasonable efforts should be made to mitigate, if not eliminate, the phenomenon.

The CRC had considerable discussions in person during the face-to-face meetings in Chile and Vienna, as well as by email, regarding further improvements that should be implemented. This was the second time eligibility rules were truly put into action, and as many will attest to, the process can still be improved upon.

- To deal with several issues related to the submission of CRC forms (late submissions, PIs not reporting on all programs, streamlining the process, etc), the CRC would like to implement an online submission system, mirroring that used for the CNTAC starting in 2016B. This system would close at the deadline automatically and exclude late submissions. This system would allow student sponsors and faculty co-Is to explicitly

acknowledge their participation without the need for letters. It could also search through past ALMA proposal lists to automatically pull up past usage for proposers to describe (both as PI and possibly as co-Is, to capture the ultimate usage from transient users such as students, postdocs, and visitors).

- Further thought may be needed to arrive at the best deadline. The day after was deemed as especially bad timing by at least a few CRC members. The CRC should consider moving the deadline for cycle 5 by a few days, although this has to be balanced by the increased pressure it puts on the CRC members to evaluate the proposals.

- The community, through SOCHIAS, needs better definitions of faculty, postdoc, student, and visitor. This is particularly important to determine which type of faculty are eligible to co-sponsor ALMA proposals and apply as co-PIs on large programs. In particular, there needs to be accountability for these allocations over the entire 3+yr time frame it takes to propose, observe, reduce, analyze, and ultimately publish results on a given program. In particular, what does it mean to be “permanent” (in terms of hours, who pays salary, etc). These rules should be clear cut and easy to implement.

- LPs requesting substantial amounts of Chilean time should have broad impact with the Chilean community. It was agreed upon that enforcing a restriction as low as 10-15% of Chilean time would likely unfairly limit cutting edge proposals from Chileans. However, at the same time it was acknowledged that a single proposal or PI accounting for >~30% of the Chilean time to pursue relatively niche science represents a potentially unfair restriction on the rest of the community, should the project(s) be awarded. The CRC therefore recommends that if PIs are requesting >~30% of the Chilean allocation, they must demonstrate broad community involvement or offer data access to anyone in Chile. A further issue with LPs that needs to be resolved with ALMA is when the CRC determines an LP is not eligible for CL time, that proposal would be removed from evaluation entirely rather than being redistributed among the remaining PIs.

- Rules regarding conflicts of interests and confidentiality among CRC members need to be better defined and enforced. At the beginning of each cycle, it should be brought up to reinforce and remind members of what is expected.

- It is absolutely critical for the Chilean community to have easy access to statistics showing the fractional time being awarded, observed, completed, delivered, etc. for each regional partner as functions of RA, band, configuration, PWV, etc. Additionally, it would help to see the relative weighting by APRC rank, regionally-normalized APRC rank, or similar scheme.

4) Conclusions and Recommendations. The review process overall is quite intense due to the very large number of proposals (>80-100) that must in theory be evaluated by each panel member. Bringing together 145 researchers and 40 ALMA staff, many of whom are key figures

in their respective fields, is a massive operation and involves a tremendous amount of resources and coordination. For each reviewer, there is both considerable preparatory work in the weeks leading up to the meeting, as well as during the weeklong event itself.

CL participates in this international endeavour on essentially equal footing with the other executives, with a presence also at the APRC and the Director's Council meeting. The science assessments are supposed to be carried out without regional considerations, and the CRC did not find any obvious cases of bias in cycle 4. All in all, it is the impression of the CRC that the evaluation process was fair with respect to Chilean interests and continues to improve the competitiveness of Chilean scientists on the international stage.

Concerning the tasks of the CRC to evaluate CL proposals for eligibility and impact on Chilean science, the CRC had a number of recommendations in order to improve the process in Cycle 5 and beyond. These are:

1. First and foremost, CONICYT and Universidad de Chile should create formal documentation specifying the tasks of the CRC, signed by the proper authorities of those institutions and made public.
2. Migrate the submission process to an online application form to improve and streamline the process: control late submissions; allow copying / editing of past information in subsequent years for consistency and to save time; facilitate PI reporting on all programs; simplify the process by which co-I sponsors acknowledge/confirm participation; enable past usage reporting by co-I sponsors.
3. Allow 2 days between the ALMA and CRC deadlines.
4. Work with SOCHIAS to establish very clear definitions of the different categories of proposer and how each one can apply for ALMA time.
5. Establish thresholds on LP programs and the ability of the CRC to veto them. One option is to enforce the formal 15% limit on LPs in the overall ALMA observing budget on co-PI regional shares as well. Another would be if co-PIs request allocations above some threshold (e.g. 30% of Chilean time), the Chilean community should be automatically provided data access.
6. Clarify rules on how conflicts of interests and confidentiality are determined/dealt with.

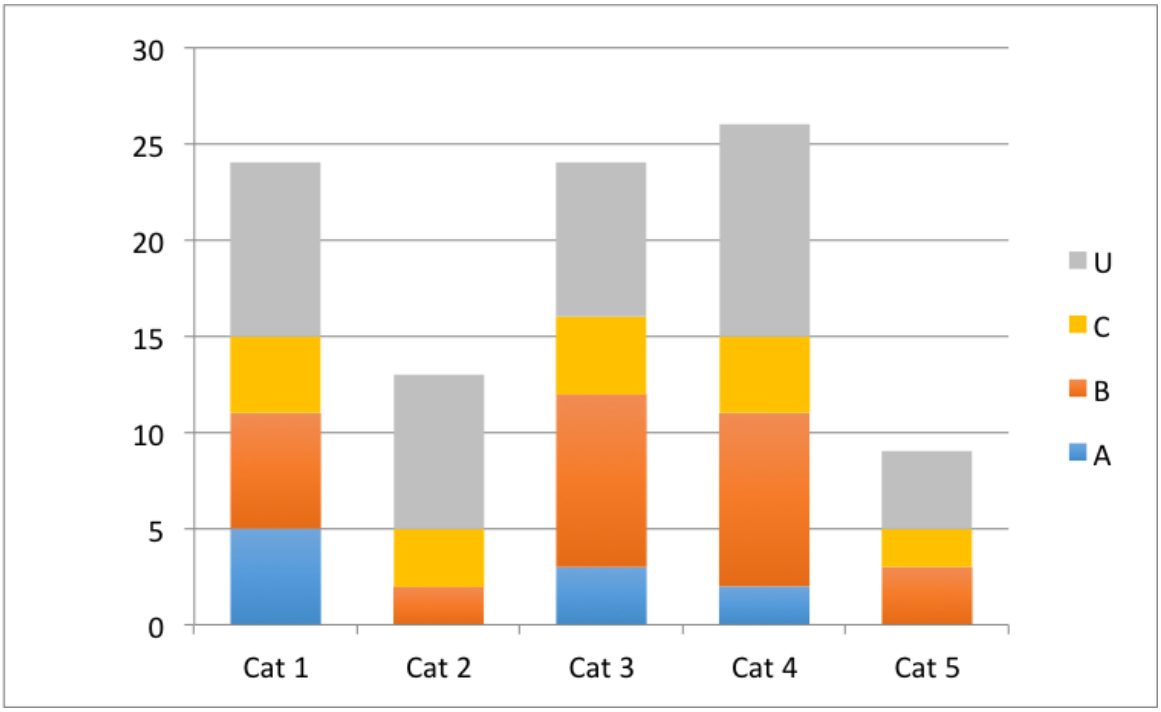
Also, having been through the review process a few times, the CRC has provided some recommendations and/or comments to ALMA and/or the Chilean ALMA Board representatives for consideration in Cycle 5. These include the following:

- Despite language in the Assessor handbook about grading norms, some Assessors vote at the extremes of the system (e.g, using flat vote distribution), such that their grades can still strongly influence the end result. ALMA should adopt a clipped mean ranked score that rejects the highest/lowest scores.
- Fractional allocation of LPs should be up to each co-PI to decide and not based on number of co-PIs.

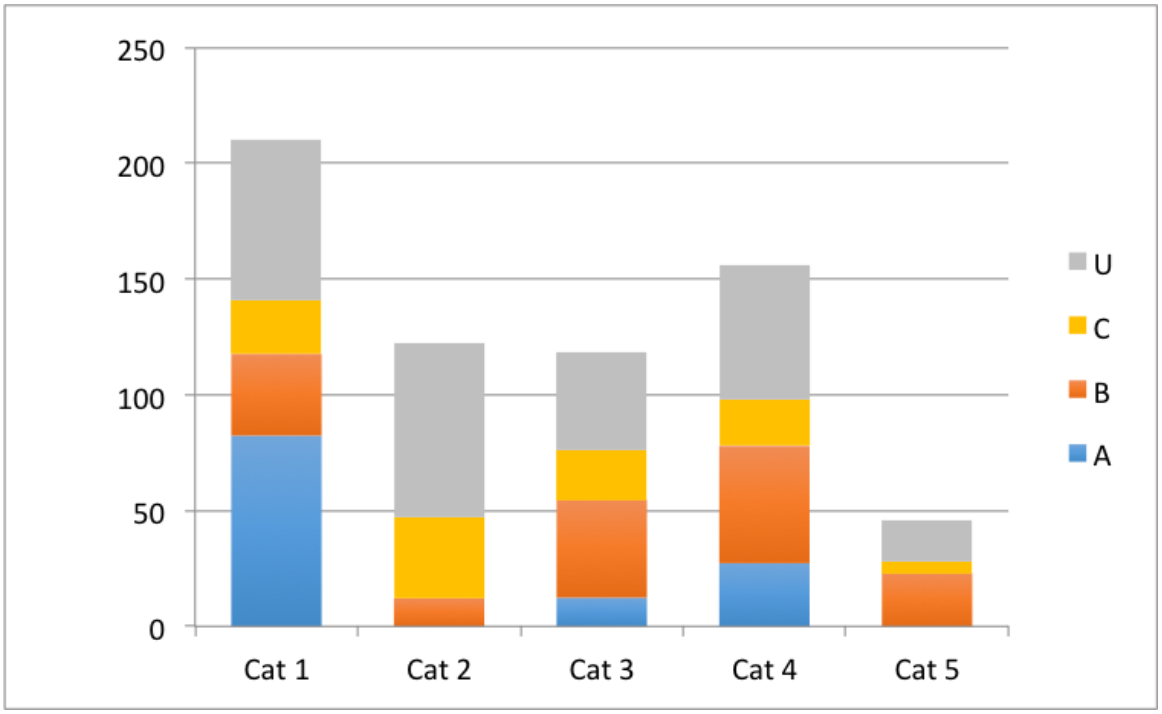
- Need to determine better policy for instances where the CRC may reject an LP.
- Need to establish formally *equal* grade A allocation among partners.

With regard to documentation, the CRC recommends that key documents relating to Chile's involvement in ALMA and reports made by the CRC and CHANCO be made public in some form, so that all of the information is available from one place.

Appendix: Science category distribution.



A1: Distribution of CL proposals among Categories 1 through 5 by number of proposals. Grades: A (blue), B (orange), C (yellow), Unobserved (grey)



A2: Distribution of CL proposals among Categories 1 through 5 by requested hours. Grades: A (blue), B (orange), C (yellow), Unobserved (grey).