

CRC Report for CHANCO for ALMA Cycle 3

Cycle 3 CRC Members: Franz Bauer (Chair), Felipe Barrientos, Amelia Bayo, Simón Casassus, Lucas Cieza, Stefan Kimeswenger, Paulina Lira, Diego Mardones, Thomas Puzia, Ezequiel Treister.

Executive Summary

In the view of the CRC, Chile is participating in the international process on equal footing with other executives, with few obvious biases, and Chilean requests to ALMA are being acknowledged and followed. During the ALMA Cycle 3 review process, the CRC carried out all duties required of them, including the evaluation for the first time of the Chilean (CL) eligibility status, as well as full participation in the nominal ALMA Review process. This eligibility evaluation went relatively smoothly: three CL proposals were removed, while several more were discussed within the context of “Palo Blanco” and past usage. Looking forward, the CRC feels that there is still room for improvement with respect to this initial eligibility evaluation of CL proposals, and recommends the following strategy:

- 1). The CRC should continue to evaluate Chilean eligibility, but with a streamlined process which ideally incorporates the use of the SOCHIAS ‘Lista Blanca’, clearer documentation and forms, and a time-limited appeal process.
- 2). The CRC additionally should require and evaluate 1-page work plans for each CL proposal, where the roles of all investigators are clearly spelled out, with emphasis on the Chilean contributions, and information relevant to evaluating the overall impact on Chilean science is provided. The CRC notes that a non-negligible number of submitted proposals appear “out of context” compared to PIs historical research lines, and would like to provide an opportunity for Chilean PIs to explain these new projects and how they will impact Chilean science.
- 3). Documentation regarding the “Proposal for Chilean Participation in ALMA” and reports from both Chanco and CRC should be formalized and regularly published (perhaps in a redacted format if necessary, possibly on the current ALMA-CRC webpage).

Additionally, during the face-to-face ALMA review process, two key issues arose. The first surrounds how duplications are dealt with by ALMA, which is quite limited in scope. This process often misses many real science duplications, and is not assessed uniformly or consistently across panels. Furthermore, in the de-scoping process, the highest ranked proposal is usually given priority, but this should ultimately account for which proposal will be the first observed in the queue. A final issue is related to how international proposals are charged to the partners. At the moment, Chile is being charged at a rate of 10% for all international programs that win time, amounting to a commitment of 1-2% of Chile’s total allocation.

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 3.

Each of the 12 ALMA Review Panel (ARP) was composed of eight Science Assessors, including a Chair and a Deputy Chair. Ten of these panelists were invited from Chile, spread out amongst the 12 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. One of the Chilean panelists, 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 3 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 three ARPs assembled for each of categories 1, 2, and 3, two ARPs for category 4, and one for category 5.

In an attempt to lessen the workload of the panels, science assessments were made in two stages. In Stage 1, each proposal was assessed by one Primary Assessor and three Secondary Assessors of the ARP to which it was assigned. Based on the resulting ranking, only ~75% of the proposals proceeded to Stage 2, where they were reviewed and discussed by all members of the relevant ARP. The proposals discarded at stage 1 were considered "Triaged" proposals.

Prior to the scientific evaluation, a new process was initiated by the CRC to screen submitted Chilean proposals for Chilean eligibility status. For this, the CRC worked with the directors of CONICYT and the Department of Astronomy (DAS) at Universidad de Chile to formulate a set of eligibility and usage rules, which were published on a website at http://www.das.uchile.cl/das_alma_crc.html, and formalized in an agreement with ALMA authorities to incorporate this screening into the Cycle 3 Call for Proposals before the commencement of Stage 1. The eligibility requirements were: **(1)** CL PIs must be affiliated with

a Chilean Institution and reside in Chile for at least 1 yr, with the duration of residency reasonably overlapping the ALMA cycle 3 observing period; **(2)** proposals must include at least one permanent Chilean faculty member among the proposers (as PI or co-I); **(3)** student-led proposals require a support letter from their supervisor; **(4)** the PI must submit a ½ page report on past ALMA usage, summarizing the analysis and publication status from all previously observed ALMA programs as PI, with emphasis on Chilean participation. To assess requirements 1 and 2, the CRC chair contacted all relevant department chairs to confirm the status and residency of CL PIs. Documents for requirements 3 and 4 were submitted five days after the Cycle 3 proposal deadline, with two reminders sent to all CL PIs. The CRC convened a face-to-face meeting on May 13, 2015 to assess all of the information, and determine which proposals, if any, failed to meet the eligibility requirements. 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. Triaged proposals could be resurrected (i.e., marked to be discussed in Stage 2) by any panel member that did not have a conflict of interest. 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 3 available time.” An initial technical evaluation of the feasibility of each proposal was also made internally by ALMA during Stage 1 and provided to the Science Assessors in Stage 2; in some cases the feasibility status was modified by the ARPs during Stage 2.

For Stage 2, all Science Assessors met in Osaka, Japan during the week of June 21-25, 2015 to discuss the proposals in person. Each proposal was discussed by one ARP and reranked between 1-10. The rankings made by the ARPs 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. 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 3 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 proposals considered “outstanding” by a given ARP (approximately 25% of the total); this grade makes these proposals eligible to be carried over to Cycle 4 if they cannot be successfully completed in Cycle 3. Grade A proposals were not necessarily the top 25% by rank from each panel and no attempt was made to equitably distribute them amongst the partners. Grade B proposals are high-priority proposals, of which ~90% are estimated to be successfully observed by the end of Cycle 3. 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 not only by rank, but also to account for over/underrepresented RA ranges and bands which are traditionally more likely to be observed (e.g., bands 3-6).

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 3, 2100 12-m hours are expected to be available, for which 1583 unique proposals requesting 8878 total 12-m hrs were received and reviewed. The overall oversubscription rate for the 12-m array was thus 4.3, although it should be noted that ~20% of the submitted proposals were resubmissions of uncompleted Cycle 2 programs, the majority of which are expected to become complete by the end of Cycle 2. Broken down by Executive, there were 118 proposals for 656 12-m hrs from CL PIs, 297 proposals for 1499 12-m hrs from EA PIs, 467 proposals for 2689 12-m hrs from NA PIs, 657 proposals for 3818 12-m hrs from EU PIs, and 45 proposals for 216 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 - 39.8%,
- Pontificia Universidad Católica de Chile - 18.6%
- Universidad de Valparaíso - 14.4%
- Universidad Diego Portales - 13.6%
- Universidad de Concepción - 7.6%
- Universidad Nacional Andrés Bello - 1.7%
- Universidad de Antofagasta - 1.7%
- Universidad de La Serena - 0.8%
- Universidad Austral de Chile - 0.8%
- Universidad Católica del Norte - 0.8%

2.2) Chilean Eligibility Stage. The CRC evaluated all eligibility information obtained by May 13, 2015, finding three (3) CL proposals ineligible: one lacked a Chilean Faculty co-I, one lacked a past usage form for an observed Cycle 2 allocation, and one PI lacked status confirmation. In addition to these obvious cases of ineligibility, the CRC had extensive discussions and concerns about the past usage of some PIs and the lack of detailed work plans for Cycle 3 proposals for several other PIs, whose proposals appeared out of context compared to their historical research lines. With respect to past usage, a few PIs had several ALMA programs allocated during Cycles 1-2 and as yet no Chilean-led publications resulting from them. The CRC concluded that it was still too early to act on this alone, given the many extenuating circumstances such as: ALMA data delivery can still be significantly delayed and problematic; ALMA had yet to complete many 7-m and TP observations, some ALMA programs have only been partially completed but require all of the data before analysis can begin; some ALMA programs failed to achieve their expected sensitivity or simply yielded null results; there had not been enough time to fully analyze the data and deliver an ALMA publication. The CRC notes

that past usage is likely to be incorporated into the main ALMA evaluation criteria in Cycle 4, and hopefully many of the current concerns will likely to be addressed at a global level. With respect to “out of context” proposals, there were a several notable cases where the PIs were clearly ‘branching out’ in collaboration with strong international co-Is and detailed work cases were needed to understand what contributions the Chilean PIs and co-Is intended to have in such programs. As in past cycles, the CRC felt they did not have enough information to act on such concerns, which is reflected in the recommendations for Cycle 4 below, which strongly argue for the requirement of a clear work plan with the role of each co-I.

2.3) Stage 1 (Triage). In Stage 1, 27.4% of proposals in total were triaged, broken down by Executive as 0.2% CL, 1.8% EA, 16.6% EU, 110.6% NA and 1.0% non-partner. Of the triaged proposals, 1.4% were afterwards resurrected, resulting in an overall triage percentage of ~26% both by number and hours. In addition, 2.9% of proposals, broken down by Executive as 0.4% CL, 0.3% EA, 1% EU, 1% NA, and 0.3% non-partner, were deemed unfeasible based on the rules laid out in the ALMA Proposer’s Guide for the perceived capabilities and performance of the ALMA Observatory. Thus 2.6% and 5.1% of the submitted CL proposals were respectively triaged and deemed infeasible (with some overlap between these categories). The fraction of infeasible proposals appears a bit high compared to the other partners, but no obvious biases were found.

2.4) Stage 2. A total of 25.4% of submitted proposals were given priority grades A or B, adding up to a total 12m observing time of 2100 hrs. There were 104 Grade A proposals, of which four (4) were Chilean, or ~4%. How grade A proposals were assigned was dealt with differently by the various panels, but generally these proposals represented the top proposals *or* the top science (meaning if a panel had five proposals all with similar science goals, they might only give one an A grade). The ~4% ratio reflects the fact that the Chilean proposals overall were skewed to substantially lower grades on average than the other partners. For instance, East Asia only received eight (8) Grade A proposals, or ~8%, and thus suffered similarly. Overall, the Chilean proposals went about 2.1, 1.9, 1.2 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), which is consistent with the 4% ratio at the top. The total number of the Chilean proposals with Grades A+B (for the 12-m array) was 41 proposals, amounting to 218.2 hrs; additionally, 12.4 hrs of 7-m array time and 21.9 hrs of TP array time were allocated, respectively. A total of 236 proposals were assigned grade C, accounting for 1394.3 hrs of 12-m array time. Of those, 21 proposals were from CL, for a total of 169.9 hrs of 12-m array time. It should be noted that roughly nine Grade A+B proposals with CL PIs (for 30.5 hrs) were formally resubmissions; if observed in Cycle 2, their absence should allow several Grade C proposals from CL to advance to Grade B. *There was a general sentiment among the CRC that the assignment of Grade A should be in proportion to Chile’s 10% share, and Chile should request that this be enforced in cycle 4.*

During the stage 2 process, the CRC chair polled each CRC member to assess whether there were regional biases within any particular panel. Most CRC members were content with the level of fairness afforded proposals from various partners, although Chilean panelists from a few

panels did note that “regionality” factored into the discussion of a few proposals. This concern was conveyed to the ALMA authorities and all of the ARP chairs were subsequently asked to discourage this type of bias. Another issue that arose was how different panels interpreted duplications (ranging from being *the strict overlap of instrument configurations and pointings* to *achieving the same scientific goal for a given target, but with different configurations*) and how they de-scoped proposals that were deemed duplications (possibly downranking a proposal below its original panel grade before the merging process). The CRC chair voiced the opinion to ALMA that there was a lack of consistency and fairness in enforcement on the issue of duplications between panels that should be fixed in future cycles. Furthermore, the CRC Chair requested that full consideration of duplications should factor in “first on telescope” rankings, or ALMA will end up watering down the science carried out by the smaller partners (i.e., Chile). A final decision on these requests is pending.

2.5) APRC Meeting. The APRC meeting was held on Friday June 25, 2015. In attendance from CL were Franz Bauer, in his capacity as chair of the CRC, and Diego Mardones, by virtue of being a panel Chair. Each ARP had a similar fraction of proposals in terms of numbers and hours, so the merge was a relatively straightforward combination of the ranked lists from each ARP. Given that a substantial fraction of the top ranked proposals were resubmissions, it was noted 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 2 projects in October 2015; it is unclear whether occurred. Once the merge was complete, the primary task for the APRC meeting was then to deal with duplications, which were most severe for Science Category 1, due to a substantial number of past and current proposals targeting just a few deep survey fields. It should be noted that ALMA is also investigating how to revamp its overall duplication policy for Cycle 4 and beyond, because duplications are becoming a large and complex problem. The initial policy adopted was for proposals lower in the overall ranking to be descope in case they observed the same targets with the same configuration as a higher ranked proposal. As noted above, the CRC Chair argued that the duplication rules must also factor in a ‘first on telescope’ ranking. In the end, duplications were only enforced if they affected full science goals, which almost never happened (i.e., two proposals could observe the same targets if they formed only a part of the overall science goal, as happened in earlier cycles).

One additional issue which pertains to Chilean interests is how ALMA partners are charged for successful international (i.e., non-member) use. Any non-member proposal ranked higher than the Grade A+B limit for the most oversubscribed partner (EU in this case) will be allocated, as long as the total fraction is less than ~2-5% of the total time available. The time for these proposals comes from all partners (including CL), prorated by the fractional allocation each partner has. For Cycle 3, this meant that seven (7) proposals were allocated to non-partners, representing ~2% of each partner’s share. This represented 4.7hrs of time charged to Chile, which could be considered as a loss of ~1 proposal on average for Chile. There is an obvious concern that losing any part of the guaranteed 10% for non-Chilean use goes against the sentiment of the agreements that were signed with Chile; the CRC made ALMA aware of this

concern. On the other hand, at the moment, Chile has actually been awarded 218 total 12m hours of Grade A+B time (compared to the expected 210 hrs), because the last valid Grade B proposal is for 19 hrs; so this concern remains largely theoretical at present.

The science category distribution of all submitted CL proposals versus those graded A or B only is shown in Appendix C. It is apparent that for cycle 3 science categories 1 and 4 accounted for most of the CL time.

2.6) Director's Council "Meeting". | The Director's Council and the Chilean representative discussed via email during Aug 3-5 2015. The recommendations of the APRC were concurred by all members of the Council without modification.

3) Report on the Chilean Review Committee Tasks. The CRC would like to point out that ALMA has been observing for three 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. Moreover, the document entitled "Proposal for Chilean participation in ALMA" and the annual reports by the adhoc "Chanco" advisory committee and the CRC have not been made public.

Based on recommendations from the Cycle 2 CRC, which were echoed in the latest report from Chanco, the Cycle 3 CRC worked with the director of the DAS of Universidad of Chile to implement a series of rules to evaluate the eligibility of Chilean PIs in Cycle 3. The CRC feels that the set of rules instituted for Cycle 3 were a strong step in the right direction, but the full set of recommendations was not endorsed by the relevant authorities, and ultimately fell short of providing the CRC with sufficient information or flexibility to properly evaluate the expertise 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 feel they 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. Specifically, there were a handful of questionable cases where detailed work plans would have helped clarify the roles played by the Chilean and non-Chilean members on certain programs, and additionally would provide a written record of these roles that could then be compared to past usage information in the following years. The CRC estimated that perhaps as many as 5%-10% of proposals could have been cases where the CL PI fronted for a proposal for a foreign group and where it was likely doubtful there would be any significant Chilean involvement. The CRC felt that although such "palo blanco" proposals do 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 every effort should be made to mitigate, if not eliminate, the phenomenon.

The CRC had considerable discussions during face-to-face meetings in both Chile and Osaka, as well as by email, regarding further improvements that should be implemented. This was the first time eligibility rules were truly put into action, and thus the process was not without its flaws, which could be improved upon and streamlined. For instance, the rules and forms could have been clearer on a few points, the evaluation process should have included a short official appeal process, and a work plan emphasizing and clarifying Chilean participation for current proposals should have been implemented so that at the very least, the questionable 5-10% of proposals would have had to make their case for how they will impact Chilean science being done with ALMA.

4) Conclusions and Recommendations. The review process overall is quite intense due to the very large number of proposals (>110-130) that should in theory be evaluated by each panel member. Bringing together 97 researchers, 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 aside from a few limited cases mentioned in section 2.4, the CRC did not find strong evidence in cycle 3 for any sort of systematic bias against CL proposals. 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. Regarding Chile's continued involvement in the international review process, it is the opinion of the CRC that it would be exceptionally difficult to assemble an equivalent pool of expertise in mm/submm astronomy to assess Chilean proposals on our own, and moreover there would likely be strong conflicts of interest due to the relatively small size of the Chilean mm/submm community.

Concerning the tasks of the CRC to evaluate CL proposals for eligibility and impact on Chilean science, the CRC had several recommendations in order to improve the process in Cycle 4 and beyond. These are:

- 1) The CRC should strive to provide a clearer description of process for status and residency confirmation of the PIs. Toward this end, the CRC should adopt the use of the clearing house "Lista Blanca" that has been developed by SOCHIAS in order to more efficiently and effectively evaluate institute affiliation and residency. This will streamline the process and remove the substantial amount of work required to contact department heads over a limited time frame.
- 2) The CRC should clarify how the Past Usage report should be evaluated. The goal should be to promote CL PIs to publish their data and discourage them from sitting on substantial unpublished dataset while trying to acquire more (unrelated) datasets. One possible proposed scheme to facilitate this would be the following. Past usage

evaluations would be based only on ALMA programs with public data at moment of submission for a given CL PI. This limit would allow the CL PI a full year to analyze and publish the data after a given science goal (or all science goals) within a program had been completed. For such programs, a reasonable requirement might be that at least ~40-50% of a PI's ALMA programs resulted in a Chilean-led publication (meaning a first author with a primary Chilean affiliation). The exact fraction could be modified to account for the standard publication efficiency rate based on all ALMA partners (or just those in Chile), and would still afford CL PIs some flexibility to allow their foreign collaborators to first-author papers on some datasets or in cases where the datasets turn out to be less useful than anticipated.

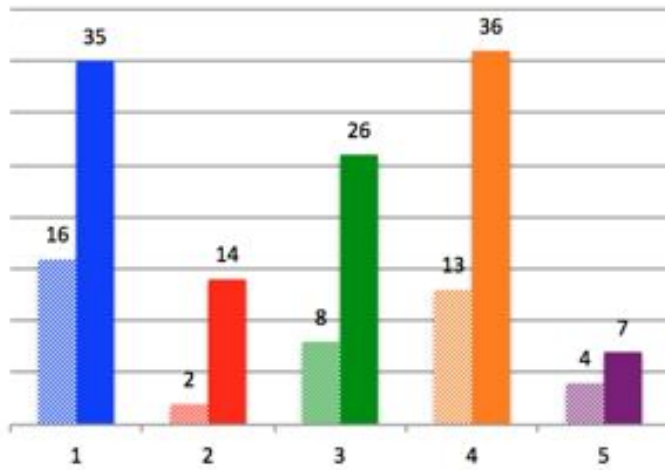
- 3) The CRC should require a work plan to be submitted with each proposal, describing in particular the contributions for both the Chilean and non-Chilean co-Is as far as "who will do what" and how the team plans to publish the results from their datasets. Clear details about the roles of Chilean faculty/postdocs/students would allow the CRC to assess more objectively the value of a proposal in terms of its contribution toward fostering Chilean science. Although such statements can be falsely made and difficult to judge at face value, documenting them will allow these statements to be cross-referenced against past usage forms in following years, where they can potentially catch inconsistencies from insincere PIs. This step would at least force people who are willing to act as "palo blanco" to misrepresent their expected role in written form in order to act in such a role.
- 4) The CRC should institute a one (1) week appeal process before reporting the results to ALMA, as there will be no retraction possible once the list of ineligible proposals is sent to ALMA.

Also, having been through the review process a few times, the CRC has provided some recommendations and/or comments to ALMA for consideration in Cycle 4. These include the following:

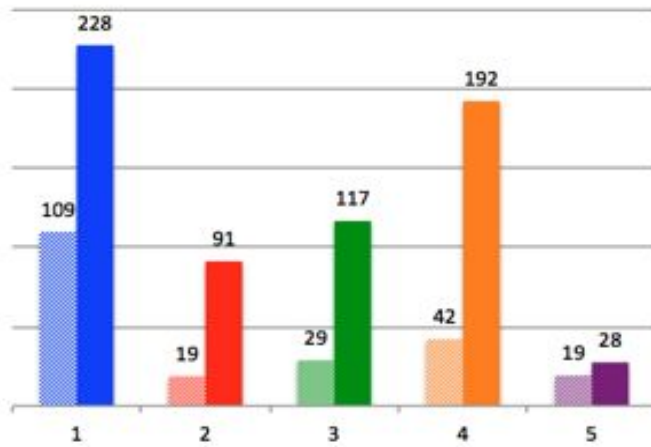
- clearer instructions from the Chairs to avoid factoring in the partner origin of the proposals during the panel discussions.
- better rules and clearer instructions regarding duplications. What constitutes a duplication and consistent enforcement across every ARP.
- clearer instructions on selection of Grade-A proposals and ensuring that partner fraction are upheld. At present, it is strongly biased toward more traditional PIs/Partners.
- There are concerns among the CRC (and presumably the Chilean community in general) about non-partner hrs coming from out of the Chilean fraction. While this is admittedly not a large fraction (~5 hrs, or 1 average program), it is unclear whether Chilean authorities approved this policy, which could be perceived to break various signed agreements.

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, perhaps linked from the current ALMA CRC webpage, so that all of the information is available from one place.

C) Science category distribution.



C1: Distribution of CL proposals among Categories 1 through 5 by number of proposals. Submitted CL proposals shown as solid and Grades A+B only shown in light solid.



C2: Distribution of CL proposals among Categories 1 through 5 by requested hours. Submitted CL proposals shown as solid and Grades A+B only shown in light solid.