



ALMA BOARD

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Subject: Updated ALMA Principles of the ALMA Proposal Review Process

AUTHOR(S): P. Cox, N. Evans & Board Science Committee

Purpose of Document: To provide the ALMA Board and the communities with the updated ALMA Principles of the ALMA Proposal Review Process

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1 Introduction

1.1 Summary

There will be a single proposal review process for ALMA to assign the observing time of the ALMA Partners and Chile, in order to optimize the scientific impact of ALMA¹. The ALMA Director is responsible to the Board for implementation of the ALMA time allocation process, and the details are described in the implementation plan ‘Cycle 3: The Review Process’, a document that will be updated for each Observing Cycle as needed [RD03].

The Joint ALMA Observatory (JAO) through the ALMA Regional Centers (ARCs) will issue the call for proposals, once per year.

The ALMA proposal review process will proceed in five stages:

1. Written Science Assessment by the ALMA Review Panels (ARP) members and, for a subset of proposals, Technical Assessment by JAO and ARC staff.²
2. Meeting of the ALMA Review Panels (ARPs), which will provide a ranked list from each panel based on scientific merit.
3. Synthesis of the rankings from each panel into an overall ranking by the ALMA Proposal Review Committee (APRC). The APRC also recommends resolution of duplications or overlaps.
4. Construction of the observing queue by the Head of Operations in consultation with the Observatory Scientist and the ALMA Director, taking into account scientific ranks, scheduling constraints and regional shares.
5. The list of scheduled projects will be sent to the Director’s Council and a representative of Chile for concurrence before time accounting is finalized.

1.2 Scope

This document applies to all the documents related to the ALMA Proposal Review Process and defines the principles governing this process.

1.3 Applicable documents

The following documents are part of this document to the extent specified herein. If not explicitly stated otherwise, the latest issue of the document is valid.

Appl.	Document Title	ALMA Doc. Number
[AD01]	ALMA Trilateral Agreement – Agreement concerning the Operations of the ALMA by NSF, ESO and NINS	
[AD02]	ALMA Management Agreement – Management Agreement concerning the Operations of the ALMA by AUI, ESO and NAOJ	

1.4 Reference Documents

The following documents contain additional information and are referenced in this document.

¹ The procedure for allocation of the Chilean time is governed by the agreement between the Chilean astronomical community, represented by CONICYT and Universidad de Chile, and the Executives. This agreement may be modified by mutual consent, in consultation with the Board and the ALMA Director.

² Most problems will be caught by the Observing Tool (ObsTool) in the proposal validation stage.



Ref	Document Title	ALMA Doc. Number
[RD01]	ALMA Operations Management Plan	ALMA-10.00.00.00.0034-A-GEN
[RD02]	ALMA Cycle 3: The Process Review	ALMA-90.00.00.00-028-A-PLA (yearly update)
[RD03]	ALMA Cycle N Proposer's Guide and Capabilities	ALMA Science Portal (yearly update)
[RD04]	ALMA Steady and Full Operations	ALMA-00.00.00-0121-A-GEN

1.5 Acronyms and Definitions

All acronyms and abbreviations used within this document are given at the [ALMA Acronym Finder](#) web page.



2 Principles of Assigning ALMA Observing Time

The overarching goal is to optimize the science impact of ALMA; therefore proposal prioritization will be according to scientific merit, while assuring each region receives its share of observing time. ALMA is an international partnership and differences that may arise in the ALMA Proposal Review Process (APRP) will be resolved based on mutual respect among the ALMA Parties and Chile.

The ALMA observing time available to the Parties during Operations shall be divided among them in proportion to their Shares of Contributions, and distributed equitably according to the seasons of the year, as explained in the Trilateral Agreement [AD01]. Following the Agreements for Scientific Cooperation in Astronomical Investigations between the University of Chile and AUI and between the University of Chile and NAOJ; and the Agreement on Scientific Collaboration for Furthering Astronomical Investigations between the National Science and Technology Council (CONICYT) of the Republic of Chile and AUI and ESO, Chile as host country receives 10% of the available time. The Users Registry (part of the Science Portal) will record the region and nationality of every investigator on the proposals. In general, the three Parties and Chile will be treated identically, as four separate regions, for the purpose of time assignment.

Therefore, the shares of the observing time among the three Parties and Chile are as follows:

- 33.75% for the European Organization for Astronomical Research in the Southern Hemisphere (ESO)
- 33.75% for the National Science Foundation of the United States (NSF)
- 22.5% for the National Institutes of Natural Sciences of Japan (NINS)
- 10% for the Chilean time, which administrated jointly by CONICYT and the Universidad de Chile.

3 Proposal Types

3.1 Regular Proposals

Regular proposals deal with observations than can be fully specified by the regular proposal submission. They may include standard and non-standard modes [RD03]. Standard observing modes are those that have been used in previous Cycles and for which the data can be reduced by the pipeline. Non-standard modes are observing modes that are less well characterized, or for which the data need to be processed by ALMA staff. The list of non-standard modes for each Cycle shall be published in the Call for Proposals.

3.2 Target of Opportunity Proposals

Target of Opportunity (ToO) Proposals should be submitted to observe targets that can be anticipated but not specified in detail, such as gamma-ray bursts or supernovae. Like Standard Proposals, these proposals must be submitted by the Cycle proposal deadline. While the target list may be left unspecified, observing modes and sensitivity requests must be specified in detail for ToO observations. Associated with these observations there must be a clear indication of the number of triggers needed to reach the science goals of the proposal, what the trigger will be for the actual observation to be performed, and the necessary reaction time for scheduling the observation after it is triggered.



3.3 Director Discretionary Time (DDT) Proposals

DDT Proposals may be submitted at any time during the on-going observing Cycle, for execution during this cycle.

To qualify for DDT usage, proposals must belong to one of the following categories:

1. Proposals requiring the immediate observation of a sudden and unexpected astronomical event (“immediate” should be understood as within a period of 3 weeks following their approval);
2. Proposals requesting observations on a high impact and timely scientific topic, motivated by developments that have taken place after the regular proposal submission deadline;
3. Proposals asking for follow-up observations of a program recently conducted with ALMA or any other observing facility, where a quick implementation is expected to provide breakthrough results.

The DDT Proposals shall be subject to the same restrictions and criteria as for Regular and ToO Proposals. DDT Proposals will be approved for execution by the ALMA Director, considering the recommendations of a Standing Review Committee, with members from the JAO and the four regions, appointed by the Executive Directors and Chile. The decision of a DDT Proposal should be done within three weeks after submission. In exceptional cases, the ALMA Director may approve projects that would benefit from a very rapid response, and inform the Standing Committee and science operations team of this decision within 24 hours.

A maximum of 5% of the total time available for observations in one Cycle may be dedicated to the execution of DDT projects, subject to revision by the ALMA Board. The ALMA Director will report on the usage of DDT on an annual basis to the ALMA Board

3.4 Special Proposals: mm-VLBI, Multi-Cycle and Large Programs

In addition to the categories defined in Sections 3.1-3.3, the ALMA Director can designate for given observing Cycles types of proposals that are not defined as Regular or ToO proposals. These include proposals for Millimeter Very Long Baseline Interferometry (mmVLBI), multi-cycle programs or Large Programs. These programs may use a different method for time charging among the regions in allowing co-Principal Investigators (co-PIs). These proposals will be evaluated by the panels and the APMC will balance their overall scientific value with their cost in observing time or other observatory resources. For each observing Cycle, the maximum amount of time for the total of all Special Programs will be defined in the Call for Proposals. Only standard observing modes for the given Cycle may be used in multi-cycle programs or Large Programs.

Large Programs require more than 50 hours of observing time (for the baseline array of 12-m antennas or the stand-alone Morita-array or ACA) in a given observing Cycle. The minimum number of hours for Large Programs will be revised, if needed, when ALMA is in Full Operations. A Large Program should address strategic scientific issues leading to a breakthrough in the field, be coherent science projects, not reproducible by a combination of smaller normal proposals, leading to high level archival data products, and contain a solid management plan ensuring an efficient utilization of the data, including analysis and organization of the efforts. To accommodate this information, the proposal form for Large Programs will be longer, including special sections. Large Programs will be reviewed together with the Regular and the ToO Proposals and will be accepted only if they receive a “A” grade and after undergoing a step of reconciliation and down-selection



between the panels at the level of the APRC. The proprietary period of Large Programs is the same as for Regular and ToO Proposals.

4 Proposal Submission

Proposals shall be submitted via the ALMA Observing Tool (OT) available from the ARCs³. Users must have registered in the User Portal before submitting a proposal⁴. All available observing modes for a given proposal cycle will be fully described on the ALMA web page accessible at each ARC ALMA User Portal. Proposal support will be accomplished via the ALMA Helpdesk available through any one of the ARCs.

A proposal will include at a minimum: (a) a cover sheet, with details of all investigators, including region affiliation and nationality, and the expected time and type of observations; (b) a scientific goal and justification; (c) the required angular resolution; (d) the required frequency and spectral resolution if applicable; (e) a table of targets and (f) a summary of the status of previous ALMA observations.

A proposal must be submitted successfully before the deadline, which will be adhered to strictly. The OT will deposit all successfully validated proposals into the archive.

4.1 Duplications

ALMA time should not be used for repetition of observations without a compelling scientific reason, such as variability studies. The Call for Proposals shall contain clear definitions of what constitutes a duplicate observation. Proposers cannot be penalized for proposing duplications of previous Cycle observations if they had no way to know about them by the proposal deadline. Duplication of observations in a different proposal in the same cycle will be handled by the Proposal Review Process.

5 Management, Science Categories, Organization, Set-up of Panels, and Conflicts of Interest

5.1 Management

The ALMA Proposal Review Process will be led by the JAO, under the supervision of the ALMA Director and the Observatory Scientist

5.2 Science Categories

The main science areas are cosmology, high-redshift universe, galaxies, galactic nuclei, the Interstellar Medium (ISM), astrochemistry, star formation, proto-planetary disks, stellar evolution (including the Sun), planetary systems, and the solar system.

³ Chile is expected to establish its own ARC using the tools developed by the other ARCs and by the JAO.

⁴ JAO scientific staff members should consider themselves from the regions of their parent Executive Observatory.



The science areas are currently organized into five categories for the proposal review process, namely:

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

These science categories may change over time to optimize the balance of proposals to each panel.

5.3 Organization of the Review Panels

Proposals are evaluated on the basis of scientific merit and technical feasibility. ALMA uses a panel-based proposal review system to ensure that scientifically knowledgeable peers representing the broad diversity of the community at large provide expert and non-discriminatory proposal evaluations. ALMA believes that inclusiveness and broad representation of the users' community produces the most compelling scientific program.

The review panels are organized and structured as follows:

- There will be one or more review panels as required (ARPs) for each category to minimize the load per reviewer and to accommodate conflicts of interest.
- Each panel comprises Science Assessors, from whom a Chair and a Deputy Chair will be designated.
- The Science Assessors and the designation of the panel Chairs and Deputy Chairs are proposed by the JAO, incorporating inputs from the ARCs⁵, approved by the Director's Council and Chile, and appointed by the ALMA Director.
- The composition of each panel and the panel Chairs should aim to represent the regions proportionally.
- None of the panel members or chairs shall be from within the JAO or the ARCs.
- A Technical Secretary (JAO or ARC staff member) will provide administrative support to the panels during the meetings, but will not participate in the evaluation of the proposals.

Panel membership should include sub/millimeter and topical expertise as well as a broader range of backgrounds including theory, multi-wavelength observations, numerical simulations, and/or instrumentation. Terms of service will be for three cycles, staggered to ensure overlap, and the panel chair will normally have served as a panel member the preceding season.

5.4 ALMA Proposal Review Committee (APRC)

- The APRC Chair is appointed by the ALMA Director, with approval by the Director's Council and Chile, and is not a member of any of the review panels. She/he should be a senior astronomer with cross-discipline expertise who is not a member of an ALMA Regional SAC, the ASAC, or the ALMA Board, nor should they be a staff member of the JAO or the Executives.
- The remainder of the APRC is comprised of the ARP Chairs and a Chilean Representative⁶.

⁵ During the period when it has not yet established its own ARC, Chile will also be invited to provide input.



- One of the APRC members will be appointed Deputy Chair.

5.5 Conflicts of Interest

Potential conflicts occur when:

- A principal investigator (PI), a co-principal investigator (co-PI) or co-investigator (co-I) sits on the same panel to which a proposal is submitted.
- A panel member is a very close collaborator of a PI, co-PI, or co-I of a proposal within that panel.
- A panel member is a close relative (i.e., immediate family member) of a PI, co-PI or co-I of a proposal within that panel.
- A panel member considers that a conflict exists with a proposal within their panel for some other reason.

While every attempt will be made to avoid conflicts of interest, it will be inevitable that some will remain due to the limited number of potential available reviewers.

- When possible, conflicts will be resolved by assigning the proposal in question to the other panel in the same science category.
- If that is not possible then the panel member with the conflict will absent him/herself from the discussion of that proposal and not attend that part of the meeting.
- Under no circumstances should a panel member with a conflict be assigned as a primary or secondary reviewer of the proposal in question.
- Panel members who identify a conflict that has not been recognized by the JAO will inform the chair of that panel of the conflict as soon as possible. The panel chair will then work with the Chair of the APRC and the JAO, following the above guidelines, to define if there is a conflict and solve the problem.

6 The Proposal Ranking and Grading System

There are two fundamental outputs from the Proposal Review Process.

1. The first is a rank-ordered list, in decreasing order of scientific importance. These rankings will be respected when forming the observing queue, factoring in scheduling feasibility.
2. The second are the grades. The ALMA proposal grading system has four categories:
 - a. **Grade A:** Highest priority proposals that will be rolled over to the subsequent observing cycle if necessary to complete. Such proposals must be suitable for roll over considering the nature of the project and the availability of configurations.
 - b. **Grade B:** High priority proposals, which will be scheduled at a lower priority than Grade A proposals. They remain in the queue only until the end of the current observing Cycle.
 - c. **Grade C:** Scientifically fruitful proposals that will be observed if a higher-grade proposal is not available for the current conditions.
 - d. **Grade D:** Proposals that shall not be observed.

The anticipated available time in each observing Cycle for the Grade A proposals (including the Large Programs) will be determined by the JAO and made known for the Call for Proposals.

⁶ Should it arise that the group comprising the APRC Chair and the ARP Chairs does not include astronomers from all four regions, the ARP members from the missing region shall elect among themselves a member to join the APRC, with the concurrence of the ALMA Director.



7 The Proposal Review Process

7.1 Preparation for the ALMA Review Process Meetings

Each proposal will be assigned a Primary Assessor (PA) and at least one Secondary Assessor (SA). The PA and SA are assigned by the JAO Head of Science Operations (HSO) to assess the proposal purely on scientific merit. The workload should be evenly distributed within each panel.

A subset of proposals (e.g., non-standard modes or Special Proposals) is also assigned a Technical Assessor (TA). The JAO and the ARCs assign the TAs, drawn from the pool of all ARC and JAO astronomers, to comment on whether the proposal can achieve the stated goals given ALMA's current capabilities.

7.2 The ARP Meetings

At the ARP meetings, the ranking of the proposals will be discussed, following the sequence outlined hereafter.

7.3 The Scientific Review Process

The only consideration for the ranking of *all* the proposals will be scientific merit.

Prior to the meetings, all written science comments (together with technical comments when needed) and grades will have been filled in and made available to the panels. For each proposal the PA will summarize all scientific and, where applicable, technical assessments, into a single consensus report, after discussion by the Panel.

The output from the ARP meetings is a science ranked list of proposals for each Panel. The ARP panels will discuss duplications and overlaps between the proposals within the Panel, as well as reconciliation between Panels when needed, and will make a recommendation for how these should be handled, based on the best scientific use of ALMA.

7.4 The ALMA Proposal Review Committee Meeting

The APRC will meet to review the ARP results to produce a single ranked list of all proposals and the comments provided by the ARP.

The APRC will also review any Special Proposals that have been recommended by the Panels. The Chair of the Panel that ranked these programs will present them to the APRC. The APRC may recommend that only a subset of these programs recommended by the panels become eligible for execution, taking into consideration the balance of time, science areas, and overlap with ongoing programs.

The APRC may revise the comments to proposers made by the ARP, as appropriate, based on any updates they may have made to the status of the proposal. In particular, it will be important that the comments still accurately reflect the science merit of the project.

7.5 Formation and Execution of the Observing Queue

The Head of Science Operations, in consultation with the Observatory Scientist and the ALMA Director, will take the recommendations of the APRC, apply adjustments that take into account practical restrictions, such as scheduling constraints, and produce a ranked list of proposals, with



letter grades. This list of scheduled projects will be sent to the Director's Council and a representative of Chile for concurrence. This approved final list will be submitted to the Observing Queue.

The Observing Queue will be executed by the JAO, keeping a continuous account of the shares of time used by each region (including Chile) of projects that have been observed.

The Head of Science Operations will monitor and record continuously the shares of observing time scheduled for each region and Chile and will regularly provide the relevant statistics to the Director's Council, Chile and the ALMA Board.

7.6 Reports to the Observers

A report on the evaluation of each proposal will be sent to the PI by the respective ARCs.

8 Timeline for the Proposal Review Process

The ALMA Director shall determine the proposal review timeline, taking into account the aim to minimize conflict with other deadlines, traditional holiday periods in the ALMA Partner regions, and other relevant factors.

9 Accounting of Time to the Executives and Chile

The method adopted to charge scheduled time to each of the four regions should be simple and transparent with clearly stated guidelines. For standard proposals and ToO proposals, 100% of the time will be assigned to the PI's region. For those programs for which there can be a PI and co-PI's, and if there are co-PI's from different regions, the time will be assigned to each region in proportion to the number of PI and co-PI's from each region⁷.

If a PI or co-PI has access to ALMA through more than one region (e.g. due to a joint appointment at two organizations or a member of an organization in Taiwan), she/he will select which region the time should be charged to.

A balancing of time to each region should be followed over two Cycles (every two years) and be reviewed by the Director's Council and reported to the Board.

10 Open Skies Proposals

Registered users of any nationality or affiliation may submit ALMA proposals. "Open Skies" Proposals have a PI or co-PI's whose affiliated organization belongs to none of the four regions.

Open Skies Proposals are handled as follows:

- Open Skies proposals will be assigned to a panel and treated in an identical way to all other proposals by both the ARP and the APRC.
- The unaffiliated time attributable to PI's or co-PI's of Open Skies proposals scheduled (under the same time accounting principle and rules set out in Section 9) will be charged to

⁷ In this context, PI's or co-PI's region refers to the region to which the organization the PI or co-PI is employed by belongs.



the three Parties and Chile according to the observing time shares defined in Section 2, up to an amount of 5% of the total available ALMA time.

- Any Open Skies time that exceeds the above limit of 5% will be charged to NA, which follows the current US government policy.
- The PI of an Open Skies Project accepted for scheduling will select which ARC she/he wishes to use for support.