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Principles of ALMA Proposal Review Process

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1 Introduction

1.1 Summary

ALMA uses a common proposal review process to assign the observing time of the ALMA Partners and Chile[1]. The overarching goal of the review process is to produce a scientifically prioritized, ranked list of proposals in a fair and impartial manner that will optimize the scientific impact of ALMA. Proposal prioritization is 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 are resolved based on mutual respect among the ALMA Parties and Chile.

The JAO, through the ALMA Regional Centers (ARCs), issues the Calls for Proposals. Projects are added to the observing queue mainly through a main call that is issued once per year. Supplemental calls may be offered as needed to solicit additional projects for configurations that were not fully allocated in the main call. The ALMA Director may also allocate Director's Discretionary Time (DDT).

The ALMA Director is responsible to the Board for implementing the ALMA proposal review process and determining which proposals are accepted into the observing queue. The implementation of the review process for the main call is described in the document "ALMA Cycle N Proposal Review Process: Guidelines for Science Assessors" and the queue-building processes are described in the document "Guidelines for building the Cycle N observing queue", where "N" refers to the current cycle. A description of the review processes for the supplemental calls is provided on the ALMA Science Portal[2], and that for DDT is described in Section 4.1.4. These documents are updated each cycle as needed.

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 version 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] https://almascience.org

Ref	Document Title	ALMA Doc. Number
[RD01]	ALMA Operations Management Plan	ALMA-10.00.00.00.0034-A-GEN
[RD02]	ALMA Cycle N Proposal Review process: Guidelines for Science Assessors	Updated each cycle as needed
[RD03]	ALMA Cycle N Proposer's Guide and Capabilities	ALMA Science Portal (updated each cycle)
[RD04]	ALMA Steady and Full Operations	ALMA-00.00.00-0121-A-GEN
[RD05]	Guidelines for building the Cycle N observing queue	Updated each cycle as needed

1.5 Acronyms and definitions

All acronyms and abbreviations used within this document are given at the ALMA Acronym Finder web page.

2 Proposal submission

Users must have registered in the User Portal before submitting a proposal. Proposal support is available through any one of the ARCs via the ALMA Helpdesk.

A proposal includes at a minimum: (a) a list of investigators, including regional affiliation and institution; (b) expected execution time and type of observations; (b) a scientific goal and justification; (c) the required angular resolution; (d) the required sensitivity; (e) the required frequency and spectral resolution, if applicable; and (g) a list of targets.

A proposal must be submitted successfully before the relevant deadline to be considered in the review process.

2.1 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 to the main and supplemental calls are not penalized for proposing duplications of previous or ongoing Cycle observations if they had no way of knowing about the statuses of those observations when the Call for Proposals is released. Duplication of observations between proposals within the same cycle are handled as part of the proposal review process.

2.2 Investigator types

The following type of investigators may be specified in a proposal:

- Principal Investigator (PI):
  PIs are responsible for the overall execution of the science program. Each proposal must specify a PI.
- co-Principal Investigator (co-PI):
  The PI may optionally specify co-PIs, who assist the PI in leading the science program. The regional affiliations of the co-PIs and PIs are used to determine which regions are charged the observing time (see Section 6). The type of proposals that are eligible to include co-PIs is indicated in the Call for Proposals.
- co-Investigator (co-I):
  The PI may optionally specify one or more co-Is who assist the PI and co-PIs in executing the science program.

3 Proposal types and sizes

3.1 Types

ALMA has different proposal types depending on the nature of the observations.

3.1.1 Regular proposals

Regular proposals deal with observations where the source targets can be fully specified at the time of proposal submission. Regular proposals include proposals that require coordinated observations between ALMA and other observatories, e.g., VLBI observations. Coordinated proposals accepted by ALMA are contingent upon acceptance of the proposal by the participating observatories.

3.1.2 Target of Opportunity (ToO) proposals

Target of Opportunity proposals observe targets that can be anticipated but cannot be specified in detail, such as gamma-ray bursts, supernovae, and comets. While the target list may be left unspecified, observing modes and sensitivity requirements are specified in the proposal. The proposal must indicate what the trigger will be for the actual observation to be performed, the necessary reaction time for scheduling the observation after the trigger occurs, and the number of triggers needed to reach the science goals.

3.1.3 Multi-cycle monitoring proposals

Programs requiring long temporal baselines to study changes in one or more targets can submit a proposal to carry out the observations over more than one cycle. Multi-cycle monitoring proposals are for projects where the temporal baseline is required to optimize the scientific return of the project. Examples include long-term monitoring of photometric variability and astrometric monitoring. Proposals for multi-cycle monitoring observations should describe the entire required program and provide a yearly breakdown of the requested observing time. Investigators with approved multi-cycle monitoring observations need not submit continuation proposals in subsequent cycles. The ALMA Director may limit the amount of time that can be allocated to multi-cycle monitoring programs.

3.1.4 Director's Discretionary Time (DDT) proposals

The ALMA Director has the discretion to allocate up to 5% of the available time during a cycle. DDT may be used to execute proposals submitted by the community or strategic projects initiated by the ALMA Director.

DDT proposals may be submitted at any time during the on-going observing Cycle. DDT proposals are approved for execution by the ALMA Director, considering the recommendations of a Standing Review Committee. The Standing Review Committee has members from the JAO, appointed by the ALMA Director, and the four regions, who are appointed by the Executive Directors and Chile. The decision of a DDT Proposal should be communicated to the PI within three weeks of submission. In exceptional cases, the ALMA Director may approve projects that would benefit from a very rapid response. In this case, the ALMA Director will inform the Standing Committee and the JAO science operations team of this decision within 24 hours.

The ALMA Director may use DDT to execute observing projects of a strategic nature for the observatory and the scientific community. These include, but are not limited to, observations to motivate interest in specific observing modes and timely observations that may yield high scientific impact. The ALMA Director will solicit input on strategic initiatives from an advisory committee

formed by the Director. The observations for strategic DDT projects shall be announced to the community before execution and the data will have no proprietary period.

The ALMA Director shall report on the use of DDT on an annual basis to the ALMA Board.

3.2 Sizes

The JAO aims to have a diverse scientific portfolio by executing a balance of programs with various sizes in terms of observing time. Proposal sizes are classified as Small, Medium, or Large based on the estimated amount of time in total needed to achieve the required sensitivity. The observing times that define Small, Medium, and Large proposals are set by the ALMA Director based on the historical proposal pressure and scientific considerations, and are published in the Calls for Proposals. Large proposals may request that programs are executed over two or more cycles. Small and Medium proposals are expected to be executed over one cycle unless otherwise specified in the Call for Proposals.

The characteristics of each proposal size may vary, including the allowed length of the proposal text, the observing modes that may be offered, and the proposal types that may be accepted. In addition, accepted proposals may be required to deliver high-level archival data products. Currently, this requirement is anticipated only for Large proposals.

4 Management and Timeline for the Proposal Review Process

The ALMA proposal review process is led by the Proposal Handling Team (PHT) at the Joint ALMA Observatory (JAO), under the supervision of the ALMA Director and the JAO Observatory Scientist. The ALMA Director shall determine the proposal review timeline, aiming to minimize conflicts with other deadlines, traditional holiday periods in the ALMA Partner regions, and other relevant factors.

5 Proposal review process

Proposals from the main and supplemental calls are peer reviewed by members of the scientific community. The ALMA Director determines the appropriate review process for each proposal type. The two review approaches are distributed peer review, in which each proposal team designates one team member to participate in the review, and panel reviews, where the reviewers are drawn from the community and meet in a face-to-face meeting in topical panels. It is anticipated that distributed peer review will be used for Small proposals and panel reviews for Medium and Large proposals.

The results from the review process will be assessed after each cycle for signs of bias. ALMA will take steps as needed to reduce any biases and ensure a fair review. The basic procedures of the different review processes are provided below. The ALMA Director may modify the procedures as needed to optimize the proposal review.

5.1 Distributed peer review

In the distributed peer review process, each PI designates one person from the proposal team to review N proposals, where N is anticipated to be about 10. The reviewer is specified by the PI at the time of proposal submission. The review process proceeds as follows:

1. The PHT at the JAO assigns *N* proposals to each designated reviewer. The JAO will avoid major conflicts of interest in the review assignments.
2. The reviewer examines the assigned proposals and notifies the PHT of any conflicts of interest not identified by the PHT. If the PHT accepts the identified conflict, the PHT assigns another proposal as a replacement.
3. Each reviewer orders the assigned proposals in terms of scientific merit on a unique scale from 1 to *N* and provides written comments on the strengths and weaknesses of each proposal. The PHT sends the individual comments from the reviewers to the PIs.
4. If the reviewer does not submit the orderings and the comments by the designated deadline, the proposal in which this individual was identified as a reviewer will be declined unless there are exceptional circumstances.

The PHT uses the individual proposal orderings from the reviewers to create a scientifically-ranked list of proposals.

5.2 Panel review

The Lead of the PHT invites members of the community to serve as Science Assessors on the ALMA Review Panels (ARPs), which meet to evaluate assigned proposals. The ALMA Proposal Review Committee (APRC) consists of the Chairs and Deputy Chairs of each panel and an appointed APRC Chair.

5.2.1 The ALMA Review Panels (ARPs)

The ARPs are organized and structured as follows:

- There will be one or more review panels as required for each category to minimize the load per reviewer and accommodate conflicts of interest.
- Each panel is composed of Science Assessors, from whom a Chair and a Deputy Chair are designated by the PHT.
- The Science Assessors and the designation of the panel Chairs and Deputy Chairs are proposed by the PHT and approved by the ALMA Director.
- The composition of each panel and the panel Chairs should aim to represent the regions proportionally.
- A Technical Secretary (a JAO or ARC staff member) provides administrative support to the panels during the meetings, but does 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, or instrumentation. Terms of service will be up to three cycles.

Prior to the ARP meetings, all written science comments (together with technical comments, when needed) for each proposal shall be filled in and made available to the relevant panel. For each proposal, a designated Primary Assessor summarizes all scientific assessments, and technical assessments where applicable, into a single consensus report after discussion by the relevant panel.

The primary output from the ARP meetings is a science-ranked list of proposals for each panel. Feedback based on the comments of the ARP is provided to PIs.

5.2.2 The ALMA Proposal Review Committee (APRC)

The APRC is organized and structured as follows:

- The APRC Chair is appointed by the ALMA Director to ensure, on behalf of the community, that the panel review process is executed in a fair and transparent manner. The APRC Chair should be a senior astronomer with cross-discipline expertise who is not a member of the ALMA Board, a staff member of the JAO, or a staff member at an ALMA Regional Center (ARC).
- The remainder of the APRC is comprised of the ARP Chairs and Deputy Chairs. If a region is underrepresented among the panel Chairs and Deputy Chairs, the ALMA Director shall appoint additional panel members from that region as APRC members.

The main goal of the APRC is to review the ARP results and produce a single ranked list of proposals reviewed by the panels. The APRC may recommend that only a subset of programs recommended by the panels become eligible for execution, taking into consideration the balance of time, science areas, and overlaps with ongoing programs. The APRC also provides comments on how to improve the proposal review process in future cycles.

5.3 Conflicts of Interest

Proposals are assigned to reviewers in a manner that will provide informed, unbiased assessments of the proposals. In general, a reviewer has a major conflict of interest when their personal research would benefit if the proposal under review is accepted or rejected. Major conflicts of interest occur, for example, when:

- The reviewer is a PI, co-PI, or co-I on the proposal.
- The reviewer is a very close collaborator of a PI or co-PI of a proposal.
- A reviewer is a close relative (i.e., immediate family member) of an investigator of a proposal.
- A reviewer considers that a major conflict exists with a proposal for some other reason.

The complete criteria for the conflicts of interests will be established by the PHT. While the PHT will make every attempt to avoid conflicts of interest, inevitably some will remain. Reviewers are responsible for identifying and declaring any major conflicts of interest not identified by the PHT.

6 Share of Observing Time

6.1 The Executives and Chile

The available ALMA observing time is divided among the Parties 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 Universidad de Chile and AUI and between the Universidad de Chile and NAOJ; and the Agreement on Scientific Collaboration for Furthering Astronomical Investigations between the Agencia Nacional de Investigación y Desarrollo (ANID) of the Republic of Chile and AUI and ESO, Chile as host country receives 10% of the available time. In general, the three Parties and Chile are treated identically, as four separate regions, for the purpose of time assignment.

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); and
- 10% for Chilean time, which is administrated jointly by CONICYT and the Universidad de Chile.

The method adopted to charge scheduled time to each of the four regions should be simple and transparent with clearly stated guidelines. Time is assigned to each region in proportion to the number of PIs (and co-PIs, if applicable) from each region[3] listed on the proposal. PIs or co-PIs that have access to ALMA through more than one region (e.g., due to a joint appointment at organizations in more than one region or a member of an organization in Taiwan) shall select which region to which the time should be charged. The observing time for strategic DDT programs from the ALMA Director is charged to all regions in proportion to their observing share.

A balancing of executed 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.

6.2 Open Skies proposals

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

Open Skies proposals are handled as follows:

- Open Skies proposals are reviewed identically to all other proposals.
- The unaffiliated time attributable to PIs or co-PIs of Open Skies proposals scheduled are charged to the three Parties and Chile according to the observing time shares defined in Section 6, up to an amount of 5% of the total available ALMA time.
- Any Open Skies time that exceeds the above limit of 5% is charged to North America, which follows current United States government policy.
- PIs of accepted Open Skies projects can select which ARC they wish to use for support.

7 Observing queue and notification to Principal Investigators

7.1 Building the observing queue

The JAO assigns grades to each proposal which reflect the priority in the observing queue. The grades are assigned based primarily on the scientific rankings from the proposal review process, but also the amount of time assigned to each region, the proposal pressure in the various configurations, and the historical weather conditions.

Accepted proposals are nominally added to the queue for one cycle unless otherwise specified in the Call for Proposals. Large and Multi-cycle monitoring proposals are permitted to be in the queue for more than one cycle.

The ALMA proposal grading system has four categories:

1. **Grade A:** Highest priority proposals that, if necessary, can be carried forward one additional cycle to complete.
2. **Grade B**: High priority proposals which are scheduled at a lower priority than Grade A proposals.

[3] In this context, a PI's or co-PI's region refers to the region to which the organization employing the PI or co-PI belongs.

3. **Grade C**: Scientifically fruitful proposals that are observed if a higher-grade proposal is not available under the current conditions.
4. **Grade U**: Proposals that shall not be observed.

The anticipated time available in each observing cycle for the Grade A proposals is determined by the JAO and made known in the Call for Proposals. In building the observing queue, Large proposals can only be assigned Grade A. Accepted DDT proposals or projects will have top priority in the queue unless otherwise determined by the ALMA Director.

7.2 Reports to the PIs

A report on the evaluation of each proposal is sent to the PI by the PHT.

7.3 Approval of the observing queue

For the main and supplemental calls, the ALMA Director sends the list of scheduled projects to the Director's Council and a representative of Chile for concurrence. This approved final list is then submitted to the observing queue.

7.4 Execution of the observing queue

The JAO executes the observing queue. The JAO also monitors and records the shares of observing time charged to each region and regularly provides the relevant statistics to the Director's Council, Chile, and the ALMA Board.

If gaps develop in the observing queue, the ALMA Director may approve additional projects among the submitted proposals in the current cycle, taking into account scientific ranks, regional shares, and scheduling constraints.

If the eligible PI projects cannot fill the available time and a supplemental call is not viable, the ALMA Director may fill the time with observatory projects. These projects may not duplicate PI projects. These projects will be awarded Grade C and the data will have no proprietary period. The projects will be announced to the community before execution, and the time will be charged toward all regions in proportion to their observing share. These proposals will not be charged against the 5% allocation of DDT.