User's Guide to the East Asian ALMA Regional Center (EA-ARC)

Japan (EA-ARC), Taiwan (EA-ARC node),
and Korea (EA-ARC node).

www.almascience.org

User Support:

For further information or to comment on this document, please contact your regional Helpdesk through the ALMA User Portal at **www.almascience.org**. *Helpdesk tickets will be directed to the appropriate ALMA Regional Center at ESO, NAOJ or NRAO.*
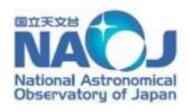
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Contributors

East Asian ALMA Regional Center

In publications, please refer to this document as:

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Contents

Scope

This document explains the role, structure, duties and function of the East Asian ALMA Regional Center based at NAOJ (National Astronomy Observatory of Japan) ALMA Project at the Mitaka Campus in Tokyo, Japan; the Taiwan node at the ASIAA, in Taipei; and the Korean node at KASI, in Daejeon.

Web Resources

ALMA Science portal
http://almascience.nao.ac.jp

ALMA Helpdesk

https://help.almascience.org

EA-ARC Webpage
https://researchers.alma-telescope.jp/j/ea-arc/ (NAOJ, Japanese)
https://researchers.alma-telescope.jp/e/ea-arc/ (NAOJ, English)
http://alma.asiaa.sinica.edu.tw (Taiwan Node, English)
http://alma.asiaa.sinica.edu.tw/index_c.php (Taiwan Node, Chinese)
http://alma.kasi.re.kr (Korean Node)

EA-ARC workshops & events information
https://researchers.alma-telescope.jp/e/event/

Observing Tool (proposal preparation tool)
https://almascience.nao.ac.jp/proposing/observing-tool

CASA (Data reduction)

http://casa.nrao.edu/

1. ALMA and EA-ARC mission goals

The ALMA telescope is a global collaboration involving East Asia, Europe, North America and the host country, Chile. ALMA comprises 66 high-precision antennas equipped with receiver and digital electronics system with a future capability to observe the 30 GHz to 1 THz frequency range, with angular resolutions as high as 5 milli-arcseconds as a goal. Using a fully dynamic scheduling system and innovative calibration strategies, the ALMA system will allow us to make the best use of the atmospheric conditions on the Chajnantor plateau, at 5000 m altitude in the Atacama desert. The highest quality science produced with ALMA in the mm/submm bands is enabled through competitive proposal application, incorporating the widest possible user community, comprehensively supported by the regional ALMA centers (ARCs) at each stage from proposal submission to data-delivery and data analysis. The ARCs also manage local data distribution and data archiving.

The East Asian ARC (EA-ARC) is based at the National Astronomical Observatory of Japan (NAOJ) with Taiwan and Korean nodes in Taipei and Deajeon, to help users fully exploit the capabilities of ALMA and maximize ALMA's scientific return. ALMA will appeal to a much broader range of astronomers than the conventional mm/submm community, and ALMA users of all levels and backgrounds are invited to take advantage of the assistance and expertise available at the EA-ARC.

2. The East Asian ALMA Regional Center (EA-ARC)

The EA-ARC comprises a core office located at the NAOJ Mitaka campus in Japan, the Taiwan Node at the Academia Sinica Institute of Astronomy and Astrophysics (ASIAA) and the Korean node at the Korea Astronomy and Space Science Institute (KASI). The Japan, Taiwan and Korean offices are coordinated by close collaboration of their respective managers and local staff. While the three sites have strong focus towards their respective local user-base, the services and facilities are largely consistent throughout.

2.1 The EA-ARC services

1. EA-ARC user and observatory support
   EA-ARC is composed of people engaged in scientific support, computer hardware and software support, archive maintenance, education, and public outreach. The roles of user support and observatory support are detailed in section 2.2 and 2.3. Information of the EA-ARC staff is maintained at:

   https://researchers.alma-telescope.jp/e/ea-arc/ (NAOJ)

   http://alma.asiaa.sinica.edu.tw (Taiwan Node)

   http://alma.kasi.re.kr (Korean Node)

2. Tutorials, Workshops and training
   The EA-ARC holds ALMA user's meetings, regional town meetings, and provides up to date information in conferences, workshops and astronomical society meetings. At these workshops, information on current and proposed capabilities is shared. Tutorials and hands-on sessions using the Observing Tool and CASA for proposal preparation and data reduction are also provided for the community. Feedback is specifically solicited from the user-community to improve ALMA operations during these meetings, although feedback is welcome at any time. A list of tutorial and workshop events is maintained at:
   https://researchers.alma-telescope.jp/e/event/ (NAOJ)

   http://alma.asiaa.sinica.edu.tw/twarc_tutorials.php (ASIAA)

   http://alma.kasi.re.kr/Korea_ARC_Node_Events.php (KASI)

3. Face-to-face meeting

A small number of visitors can be accommodated at NAOJ, ASIAA or KASI, for face-to-Face support, typically this is data processing assistance provided by EA-ARC support staff. Some funding is available for travel and accommodation (See also section 3.4). Requests for face-to-face support should be submitted via the Helpdesk system described in section 3.3.

2.2   EA-ARC user support roles

The EA-ARC offices in Japan, Taiwan and Korea are staffed by a number of active scientists and postdoctorate personnel, who together provide support for research scientists, at all stages of proposal preparation, as well as data processing. The EA-ARC staff have wide experience in mm/submm astronomy with particular expertise in interferometer mosaicking, single-dish data processing, combination of interferometric data and single dish data, polarimetry, solar observations and data processing, and advanced data analysis. The EA-ARC scientific staff, their research interests and support roles are introduced at:

https://researchers.alma-telescope.jp/e/ea-arc/staff.html (NAOJ)
http://alma.asiaa.sinica.edu.tw/people_arc.php (ASIAA)
http://alma.kasi.re.kr/people_staff.php (KASI)

Each ARC staff member has a unique set of task allocations, as primary leads in various ALMA subsystems, and cognizant roles (i.e. a regional expert and contact person) in some systems - e.g. the 'Archive Cognizant lead' will represent the EA-ARC within the ALMA-wide Archive working group, and contribute when cross-ALMA discussions and decisions are taking place.

The core tasks of the EA-ARC scientific staff include;

Contribute to the preparation and distribution of user documentation.
> As the ARC staff have a diverse expertise, it's beneficial for all staff to contribute to the development of user-documentation and user support.

Organize training material, tutorials, workshops, user's meetings, and visitor support.
> As the ARCs have wide representation in many ALMA subsystems, the expertise is diverse and knowledge transfer from the cognizant leads to the user community, and within the ARC nodes themselves is an important function (please see sections 3.4 and 3.5 for more details).

Respond to ALMA Helpdesk queries.
> EA-ARC Helpdesk Cognizant leads will determine the first-response to incoming Helpdesk tickets. Helpdesk lead may choose to defer the response to a different ARC staff member, or even to a different ARC that might be in a better position to respond quickly, and usefully. A meaningful response to any Helpdesk submission is guaranteed within 48 working hours, and for this reason, users should ensure that they use the Helpdesk for queries to the ARCs, and not private email to the staff, which cannot be managed by the Helpdesk team.

Perform support duties to PIs on a personal level, as their 'contact scientist'.
> Each successful ALMA observing project will be assigned to an ARC Contact Scientist from amongst the EA-ARC staff, relevant to their node. Communication between the Contact Scientist and the PI should be made via the Helpdesk. Contact Scientists will contact users *after* notification of the proposal submission outcome, primarily to discuss and finalize the observing process (called "phase 2", see section 4.4 for more details), and will remain through the observations until the end of the quality assurance process and final delivery of the data products to the user.

Generate, verify, correct and describe to PIs, observing scheduling blocks ('Phase 2').
Phase 2 refers to the process where the project proposal is converted into observing instructions. The PIs will not be exposed to the Phase II aspect. What was previously the "phase II checking" stage will involve only the confirmation of the Phase I content, and adjustment where necessary, prior to committing the project to the observations queue (see section 4.4 for more detail).

Archive Research Support.
A mirror site of ALMA science data archive is kept at NAOJ. Raw data, calibrated synthesized images, calibration and imaging scripts, and some additional files will be available through this archive mirror after the quality assurance. After the specific proprietary period (12 months for regular projects and 6 months for DDT projects), all the data will be public for users. Any users are welcome to exploit the public data for their science. EA-ARC can assist users in using the archive, including face-to-face consultation.

2.3   EA-ARC Observatory support roles

Assist Joint ALMA Observatory (JAO) in the Proposal Review Process.
ARC staff can serve as Technical secretaries. In this capacity, the Technical secretary provides support to the proposal reviewers.

Serve as Astronomers-on-Duty (AoD) for on-site observations monitoring.
ARC staff serve as astronomers-on-duty at the Operations Support Facility in Chile, for a total of 8 weeks, shared within the ARC. This is a core responsibility for all Executives. The ARC staff are therefore up to date in the operations of ALMA, develop and maintain a continuing face-to-face communication between the ARCs, and JAO.

Undertake data reduction, data quality assurance (QA) and enable distribution of data to PIs.
ALMA is responsible for reducing the PIs' data to assure the data quality. Pipeline calibration and imaging have been fully commissioned for most observing modes employed in previous cycles but about 25% of observing projects will still be calibrated and imaged manually using standard scripts (e.g., high frequency bands, full polarization, solar data). The data processing will be done using a combination of the pipeline and manual analysis using CASA. The pipeline calibration and imaging can be run both at ARC and JAO. Almost all manual data processing will be done at ARC.

2.4   EA users: Japanese, Taiwanese, and Korean regions

EA users supported principally by EA-ARC staff are all those carrying out research based in any Japanese, Taiwanese or Korean Research Institutions or Universities. However, Taiwan-based researchers can select, via the ALMA science portal that their principal support be based in *either* the East-Asian, or North-American ARCs, to which their observing time will be allocated. Further information about the Taiwan office can be found at: http://alma.asiaa.sinica.edu.tw.

3. User communication, information, news and help

3.1.   The ALMA Science Portal

The science portal serves as a nexus for all ALMA-related matters;
• Proposal information - building and submitting your proposals.
• Archive access - a data repository and portal for delivered and archived data.
• ALMA proposal-development and data-reduction tools.
• Documentation on policy and operation, as well as operation of ALMA software and tools.
• Access to SnooPI to monitor the progress of observations.
• Helpdesk for users' FAQs and questions/help requests.

The East Asia ALMA science portal website can be found at: http://almascience.nao.ac.jp/

3.2.   East Asian ARC and Node information

Regional East Asian ARC information page contains similar information to the science portal site, but has a strong emphasis towards regional information such as about tutorials, meetings, local staff.
https://researchers.alma-telescope.jp/j/ea-arc/ (Japanese）
https://researchers.alma-telescope.jp/e/ea-arc/ (English)
http://alma.asiaa.sinica.edu.tw hosts information for the Taiwan node.
http://alma.kasi.re.kr hosts information for the Korean node.

3.3.   The ALMA Helpdesk
The ALMA Helpdesk is the primary means for communication between users and ALMA. Interaction is via a ticketing system, which automatically tracks user-submissions (called "tickets") and related communications across the entire global community. Access to the Helpdesk is via the science portal, thus users are required to first register with ALMA before access to the Helpdesk system: https://help.almascience.org.

Users should first consult the Knowledgebase information repository - if the information therein is not suitable, then the users should feel free to detail the specifics of their query in a dedicated Helpdesk ticket.

Helpdesk tickets will be automatically redirected to the user's respective ARC in the first instance, i.e. queries from East Asian users will be addressed by the East Asian ARC staff. Such tickets are triaged; assessed for the most rapid and timely response path; either by local ARC staff (user support specialists - USS), or redistributed back to the global helpdesk for the attention of other international experts.

In general, users should not contact the Operations staff directly (i.e. by private email); Helpdesk-submitted tickets are triaged to on-hand staff (ensuring rapid response); staff are not able to personally allocate time resources to communicate with the users directly and using the Helpdesk system enables ALMA to build its information store and share Helpdesk information, ultimately helping ALMA staff provide a more efficient service for the user.

Users can generally expect a response within 2 business days. Tickets submitted within a few days prior to the proposal deadline ('Proposal Deadline Rapid Response' period) will be accessed by the international Helpdesk pool to facilitate the most rapid response. The EA-ARC will support EA users in both English and Japanese, however to receive a prompt response within a few days of the deadline, we encourage users to use English, as doing so will enable any available ARC staff from anywhere in the world contribute a rapid reply.

Once the ticket has been satisfactorily answered, EA-ARC staff will mark the ticket as 'Resolved', and if the user is satisfied with the response, they should mark the ticket as 'Closed'.

3.4.   Support for travel to Mitaka and the nodes

For users needing or wishing to attend the ARC or nodes to discuss or re-attempt the processing of their observations, with nearby ARC/node staff support can make use of travel and accommodation provided by the ARC and Nodes. In general, support to the ARC and nodes is at a domestic level only.

The NAOJ campus hosts a dedicated networked visitor's work room with rapid access to ALMA archives and to ALMA data reduction software support (Astronomy Data Center at NAOJ, see https://www.adc.nao.ac.jp/E/index-e.htm). Working disk space is also provided for raw and processed data, as laptop use may be impractical, considering the ~1 TB sizes of ALMA data files. Users are able to request face-to-face support via a Helpdesk inquiry (see section 3.3).

4. EA-ARC roles in proposal preparation, observations & data processing

4.1.   Call for Proposal

A Call for Proposal (CfP) will be issued for each scheduling period. The EA-ARC is responsible for distributing the CfP among the East Asian user community, along with any supporting material and software tools. The CfP will inform the community about the available capabilities and provide necessary information for the submission of proposals. The EA-ARC staff identify areas of work prior to the call, update webpages, and issue announcements. The EA-ARC contributes to the various stages in the entire process, "phase 1" and "phase 2", data processing and delivery in the following ways.

4.2.   Phase 1: Proposal preparation

Phase 1 comprises simply proposal preparation and submission. ALMA proposals must be prepared with the Observing Tool (OT) (requiring registration in the Science Portal), and must include a scientific and technical justifications, targets and spectral settings, sensitivity and integration time estimation, atmospheric conditions requirements (e.g. transparency and atmospheric conditions).

4.3.   Proposal assessment

ARC involvement of the proposal assessment is minimal and restricted to assisting of proposal handling duties. Although ARC staff will be allowed to become the scientific reviewer, such an involvement is made by individual effort basis, not by an ARC duty. Users can refer to ALMA Proposal Review Process document for the detailed and latest information on the review process (https://almascience.nao.ac.jp/documents-and-tools/).

4.4.   Phase 2: Preparation for observations

The Phase 2 stage is the conversion of the project requirements into observational parameters (e.g. frequency tunings, calibration schemes, etc.) In Cycles 0-4, this was performed by ARC staff or the PI. From Cycle 5 however, the process was simplified and the PIs did not need to examine the (typically information-rich) Phase II process. Instead, successful PIs simply access their project after approval, and confirm the observations information within is correct and re-submit it back to the observatory. Minor changes to the observations can be implemented easily during this stage, however larger changes (modifying targets/frequencies, large position changes, etc.) require first the approval of the Change Request Standing Committee, and a Helpdesk ticket should be submitted outlining the changes and including a complete justification. Requests for significant changes may cause long delays in completion of the Phase 2 information and delays in the SB's being committed to the observing queue.

4.5. Data reduction & data software and archive support

During and after observations are complete, JAO and the ARCs execute a series of quality assurance (QA) checks. As ALMA matures, we expect an ever-greater quantity of data (but not all) will be processed using the automated pipeline processing. Remaining data will continue to be processed manually, using processing scripts. The complete data product package (containing raw data, calibration tables, scripts, QA reports, logs, and data products) will be made available to the PI from the EA-ARC archive through password-protected, web-based data distribution. PIs can continue to request assistance or information from their contact scientist via the Helpdesk system after data delivery, or a direct face-to-face meeting request can be made, again via the Helpdesk (see section 3.3). Where appropriate, the EA-ARC may collaborate or support the development of modified pipeline versions and advanced simulation tools.

5. ARC nodes

Taiwanese and Korean ARC nodes make effort for the user support in each country and also contributes to the EA-ARC core functions. Each node has its own areas of expertise. Users are encouraged to visit the individual ARC node web pages to obtain the most up-to-date information.

5.1. The Taiwanese ARC node at ASIAA in Taipei

Located in ASIAA, the Taiwanese ARC node was established in November 2009, as a branch of the NA- and EA-ARCs. The role of the ARCs is classified into two categories, "core functions" and "enhanced functions", and the Taiwanese ARC node collaborates with the EA-ARC for the core functions and with the NA-ARC for the enhanced functions. The Taiwanese ARC node serves all the ALMA user community at universities and research institutes in Taiwan, and offers support for the ALMA proposal and observational preparation, data reduction and data analysis. It also offers the opportunity to provide the best possible training for the staff from Universities. The Taiwanese node provides face-to-face support and accepts inquiries through email and telephone. This support is in particular reaching out to the Universities in Taiwan.

The Taiwanese ARC node provides several powerful data reduction workstations with memory up to 512 GB and a Lustre file system with total capacity more than 1.1 PB mounted on ALMA servers via 100Gb/s Infiniband for our users to reduce and analyze their ALMA data.

5.2. The Korean ARC node at KASI in Daejeon

Korea Astronomy and Space Science Institute ('KASI') has established the ALMA group for operating the Korean-node of the East Asian ALMA Regional Center (EA-ARC), developing the multi-beam receiver systems of the Atacama Submillimeter Telescope Experiment (ASTE) and ALMA Total Power (TP) Array collaborating with National Astronomical Observatory of Japan (NAOJ) (see http://alma.kasi.re.kr).

Korean-node closely collaborates with the EA-ARC center of Japan and Taiwan-node aiming for the successful operation of ALMA telescope and the fruitful scientific results in this region. For example, we hold the annual EA ALMA Science workshop by turns. KASI ALMA group hosted the 5th science workshop in November 2017.

Korean-node has supported the community related with all the activities of ALMA observations, data processing, and analysis. We held 'Town meeting' at Seoul National University (SNU; 7,12 March), Korea Institute for Advanced Study (KIAS; 21 March), and KASI (27 March), which provided users with information on current ALMA capabilities, hands-on sessions using the Observing Tool and CASA for proposal preparation and ALMA science cases. We also held the 2nd ALMA Summer School to encourage graduated students and postdocs to utilize the ALMA Achieve data at Sobaek Mountain Observatory in July 23-27, 2018.

The Korean ARC node maintains a couple of CASA servers and 600 TB storage. They have been used for QA2 by Korean ARC members and ALMA data reduction by users in Korea.