ALMA Completes Its First Science Observing Season

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The Atacama Large Millimeter/submillimeter Array (ALMA) has recently completed its first year of science observing and the second year is beginning with increased capabilities. The completion rates for European-led proposals are reported. User support activities in the European ALMA Regional Centres are summarised, together with the results of a survey of users.

Wednesday, 2 January 2013, marked the completion of data-taking for Cycle 0, ALMA's first ever science observing season. In Cycle 0, data were observed and processed on a "best effort" basis since, during this observing season, many future capabilities still had to be commissioned, new antennas integrated into the array and software and procedures still needed to be tested. Despite these constraints, it is very gratifying that of the 113 highest priority projects selected for the first Cycle, 94 % were fully or partially observed, 35 of which were led by European principal investigators (PIs). At the time of writing, 26 of these European-led projects have been fully observed and their quality assured, and the data have been delivered to the PIs. Of the other nine projects that were not fully observed, the existing data have been partly delivered. In summary, 35 European PIs have received Cycle 0 data thus far.

Cycle 0 science

The first proprietary ALMA data were delivered to users in all three executives in December 2011. It is expected that the final quality-assured Cycle 0 data will have arrived with the PIs by the end of February 2013. Many teams that received ALMA Cycle 0 data are still in the midst of the analysis and paper writing, but a number of papers based on Cycle 0 have been published already, in addition to the many based on Science Verification data. The exciting results span the whole gamut of astronomical research, ranging from submillimetre galaxies and gamma-ray bursts to shells around asymptotic giant branch stars and brown dwarfs. More details of Cycle 0 science results are presented in the summary of the conference "The First Year of ALMA Science" on p. 50.

Operations and user support

High quality end-to-end user support has always been one of the main pillars of the ALMA operations model. Even for Early Science, where it has been emphasised that the execution of observing programmes would be done on a best-effort basis, ALMA has attempted to provide optimal user support throughout the lifetime of the projects. Contact scientists appointed to all Cycle 0 projects worked together with the PIs and expert staff at the Joint ALMA Observatory (JAO) in Chile and the ALMA Regional Centres (ARCs), making sure that all Phase II material was technically feasible and in agreement with the science goals. After execution of the projects, the data went through a series of quality assurance steps, the last one being full calibration of the data and the creation of datacubes or images. Gaining experience throughout the cycle, the time between data-taking and delivery to the PI dropped to approximately one month by the end of Cycle 0.

The European ARC nodes

Throughout Cycle 0 it has become clear that the European support structure with a distributed network of ARC nodes has worked extremely well. These local expertise centres provided support to their communities by organising community days, training sessions and science-oriented meetings, provided help with the preparation of Phase 2 material and hosted users for expert face-to-face support during proposal preparation and data reduction. It is also important to emphasise that nearly all contact scientists for European Cycle 0 projects are located at the ARC nodes. ARC nodes are therefore very well up to speed on the specifics of Cycle 0 projects. Thus far, PIs and CoIs of 20 Cycle 0 projects have visited one of the seven ARC nodes for face-to-face data reduction support, with the purpose of improving the calibration and imaging of their data beyond what was already provided by the observatory.

User experience

In September 2012 the second user satisfaction survey was conducted among the nearly 4000 registered users of ALMA. One of the aims of the survey was to query users about their experience with Cycle 0 scientific operations, data processing and support at the ARCs and ARC nodes. The user profile is dominated by radio and millimetre/submillimetre astronomers using ground-based facilities. However, up to 40 % of the users are experts in wavelengths longer than the submillimetre, in space-based facilities or in theory/modelling, emphasising the diversity of the ALMA community.

More than 75 % of the users who worked with ALMA data considered their quality above average. Remarkably, only 48 % indicated that they used the ALMA data analysis package CASA to reduce their data, emphasising the need to offer more data reduction workshops to the community. The high quality of the European support structure was also acknowledged: from the users who visited an ARC node for Cycle 0 data reduction, 93 % considered the quality of support above average. The experience with the generation of Scheduling Blocks (SBs) was rated above average by 55 % of Cycle 0 users, but it should be noted that the Observing Tool was still under active development during Cycle 0. Support from the ARC contact scientists for generation of Cycle 0 SBs was rated above average by 83 % of the users.