

ATACAMA LARGE MILLIMETER/SUBMILLIMETER ARRAY

ALMA Project Progress



Figure 1. OSF Technical Facilities, showing the Warehouse (left), Antenna Assembly Building (rear left) and Technical Building (right).



Figure 2. The first ALMA production antenna at the OSF is being readied for handover to the ALMA construction project and acceptance tests.

On a normal day there are now nearly five hundred people living and working at the ALMA site in northern Chile, making it one of the largest “towns” in the area and a very busy place. Most of these people live at the 9600 foot elevation Operations Support Facility (OSF), and are housed and fed in camp facilities. Three fifths of these people work on construction of the technical building for the OSF, which is nearing completion. The first element to be finished will be the warehouse, which is needed to accommodate the influx of materials arriving at the site.

Among the new arrivals on the site are, of course, the ALMA antennas, the arrival of the first of which was reported in the previous *Newsletter*. The surface is now being installed on the first ALMA VertexRSI production antenna (Figures 2 and 3). A short video chronicling the antenna’s trip to Chile was shown at the January 2007 American Astronomical Society meeting, and can be downloaded in high, medium and low resolution format from <http://www.nrao.edu/epo>.

Since the last *Newsletter*, three 12m antennas from the Mitsubishi Electric Company arrived on July 23, and the second VertexRSI antenna is poised to join the first

on the site by mid-September. The third and fourth VertexRSI antennas are in various stages of construction.

By the end of the year, antenna testing will commence as part of the process of assembly, integration, and verification. The system integration science team in Chile will welcome NRAO’s Joe McMullin to Santiago as lead test scientist. Dick Sramek, also of NRAO, will join Joe after extended visits to CARMA and the SMA.

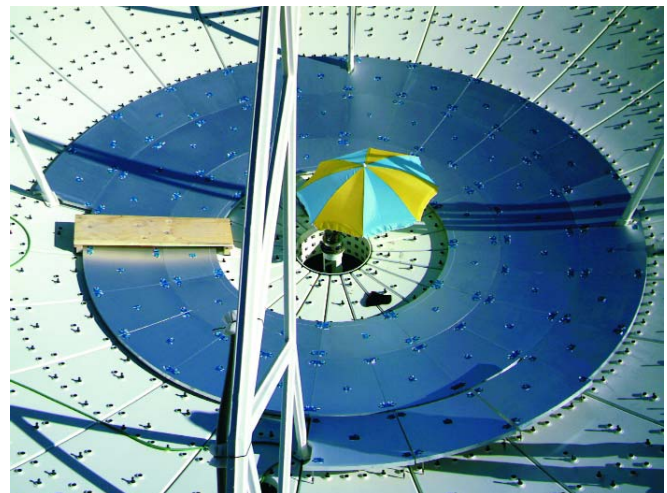


Figure 3. Tiers of panels are being assembled onto the support structure for the first VertexRSI antenna.



Figure 4. ALMA Camp element, ready for occupation.

Other members of the test scientist team are being selected. The elements needed for the testing are being assembled at the OSF. The OSF weather station will provide data for the pointing models and will be installed shortly, as will the holography transmitter.

ALMA personnel on the OSF site live in the ALMA Camp, which was recently expanded to accommodate the three to four dozen ALMA personnel working there. Figure 4 shows an entry view to one of the elements of the camp.

The first of two ALMA antenna transporters has been completed and has passed its initial operational tests. These unique vehicles have been designed to move the precision ALMA antennas between the OSF and the Array Operations Site (AOS) at 16000 feet, and among the antenna stations at the AOS during reconfiguration of the array. These mammoth machines weigh 130 tons and sit on 28 wheels. They are designed to transport a 115 ton antenna and place it on its station with an accuracy of millimeters. The first vehicle will arrive at the OSF in late 2007; it leaves the factory in Germany in October.

At the AOS, the transporter will be housed in a hangar adjacent to the Technical Building. The hangar construction will commence shortly. In coordination with the celebration of NRAO's 50th birthday, the Technical Building at the Array Operations Site was linked to the other NRAO sites via video for a simulcast cake-cutting ceremony. The ALMA correlators will be stationed in the building early next year in preparation



Figure 5. The first of two ALMA antenna transporters has been completed and has passed its initial operational tests.

for integration into the ALMA system in approximately one year.

Space has been exhausted at the current Joint ALMA Observatory (JAO) offices in Santiago; nearby space has been leased as an annex. The design concept for the ALMA Santiago Central Office at Vitacura was selected. Design development and engineering has begun. An annual ALMA External Review was held in Santiago in September; eight reviewers assessed the progress of the project.

On September 1, 2007, the ALMA Test Facility in New Mexico underwent a transition in from Prototype System Integration, with an emphasis on demonstrating system connectivity and performance, to a phase in which the emphasis is on software testing under the Computing and Science IPTs. Static fringes on Mercury have been demonstrated with the new two-antenna correlator and pre-production backends using a radiometric pointing model developed by J. Mangum and D. Emerson.

The ALMA Board held the second of its 2007 meetings in Santiago. Two new members were welcomed from East Asia: Dr. P. T. P. Ho (Academia Sinica Institute of Astronomy and Astrophysics, Taiwan) and Dr. H. Kobayashi (Director of the VERA Project, Japan). The first ALMA Front End (receiver package and associated electronics) continues testing prior to shipment to Chile by the end of the year. This Front End incorporates the first four ALMA frequency bands. A

first two-antenna correlator was delivered to the ATF; a second will be manufactured for shipment to the OSF.

The Proceedings of an ALMA Science Center Workshop held at the NAASC, From Z-Machines to ALMA: (Sub)Millimeter Spectroscopy of Galaxies, Volume 375 of the ASP Conference Series has been published, edited by A. J. Baker, J. Glenn, A. Harris, J. Mangum and Min S. Yun.

Mauricio Pilleux assumed the new post of Deputy Project Manager (Technical) for ALMA in North America. Chris Langley was appointed ALMA Back End IPT Lead.

Al Wootten

North American ALMA Science Center

The North American Science Center activities are ramping-up for support and training during ALMA commissioning and science verification (CSV) and early science. Two CSV-related scientific staff positions have been advertised, as well as a position for ALMA-related education and public outreach. NAASC staff are assisting and training at the ALMA Test Facility in Socorro, New Mexico.

NAASC staff have been involved with extensive ALMA software testing, including preparation for a limited Beta release of the CASA offline software system in the Fall, user documentation, as well as pipeline heuristics development. Details of the staged CASA Beta release plan can be found in the E2E article in this *Newsletter*. Crystal Brogan has taken over the duties of ALMA CASA subsystem scientist.

The ALMA North American Science Advisory committee held its annual face to face meeting in Charlottesville in August. The meeting was well attended, and a number of key issues were discussed, including: user grants and ALMA Board charges to the ASAC. Presentations were made by NAASC staff on project status and plans, as well as a practical demonstration of the CASA software. A report was submitted by the current Chair, Jonathan Williams (Hawaii) (See: <http://www.cv.nrao.edu/naasc/admin.shtml>). Andrew Baker (Rutgers) was selected as the new chair. Our sincere

thanks to Jonathan for his excellent leadership of the ANASAC during these formative years, and we look forward to working with Andrew and the rest of the ANASAC on North American ALMA User-related issues.

Work continued on the Splatalogue spectral line database, including an extended visit by Frank Lovas in July 2007. The catalog now contains over 3.9 million transitions and a new database server has been purchased to support this effort. As part of the updates to Splatalogue, 229,221 new/updated molecular lines were added from Lovas' own line lists including the Spectral Line Atlas of Interstellar Molecules (SLAIM). The database has been reconciled for overlaps and a common way to display and designate each individual species was developed. In addition, Lovas/NIST recommended rest frequencies have been evaluated and assigned for 12,332 molecular lines. Finally, over 3000 frequencies from recombination lines from H, He and C were added calculated from the most recent value of the Rydberg constant. The new database and additional functionality (to be described in a future *Newsletter* article), will be made available in December 2007 at www.splatalogue.net.

Operations in Chile is rapidly gearing-up for support of CSV using the first ALMA production antennas. Key hires have been made in leadership areas, such as the head of science operations (Lars-Ake Nyman) and head of administration (R. Smebak). In the coming year, ALMA Chilean operations will be hiring 84 staff, including several astronomers. The Science Operations team, including the managers of the three ALMA Regional Centers (North America, European, and East Asian) held their quarterly face-to-face meeting in September in Garching to discuss global ALMA operations plans and progress, especially preparations for CSV, near-term scientific hires, and plans for user support and software testing.

If your institution is interested in having an NRAO staff member visit and discuss ALMA, please contact ccarilli@nrao.edu.

Chris Carilli