The Atacama Large Millimeter/submillimeter Array (ALMA)

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1. Extended Abstract

The Atacama Large Millimeter/submillimeter Array (ALMA) is a versatile mm/sub-mm array for use by the astronomical community. ALMA is located in the Atacama Desert in northern Chile at an elevation of 5000m, and it consists of sixtysix high-precision antennas which can be moved into arrays with baselines up to 16 km. Fifty of these antennas are 12-meter dishes in the 12-m Array, used for sensitive, high-resolution imaging. The remaining sixteen antennas make up the Atacama Compact Array (ACA), also known as the Morita Array, used to enhance wide-field imaging: twelve of those are closely spaced 7-meter antennas (7-m Array), and four are 12-meter antennas for single-dish observations (Total Power Array). ALMA has a collecting area of 6600 m^2, an instantaneous bandwidth of 2 x 8 GHz (two polarizations) and a set of receivers for observations between 84 and 950 GHz. Already during the build-up phase ALMA produced transformational science.

Early Science with ALMA started in 2011 with 16 antennas and limited capabilities. ALMA is now in its fifth cycle of operations (Cycle 4) and is expected to reach steady state in Cycle 5. Since Cycle 3 the observing cycles are annual, starting on October 1. During each of the last cycles about 1600 proposals were submitted by the community, and the total oversubscription factor is about a factor 4. Apart from spectral line and continuum observations ALMA now also offers capabilities such as linear polarization, Solar observations and VLBI. Proposal types include regular proposals, Large Programs (> 50h of observing time), target of opportunity and Director's Discretionary Time proposals.

ALMA data is processed by ALMA staff using both a pipeline and manual data reduction (the latter mainly of data from new capabilities not yet included in the pipeline heuristics). Deliveries include quality assessed images. The proprietary time of the data is one year after delivery, and by now almost all of the Cycle 0, 1 and 2 data is publically available.

So far ALMA has delivered data to more than 1000 projects that currently have resulted in over 570 refereed publications. There is also an ALMA Development Program led by the community for studies and implementations of improvements to ALMA hardware, software and techniques.

ALMA is a partnership of ESO (representing its member states), NSF (USA) and NINS (Japan), together with NRC (Canada), NSC and ASIAA (Taiwan), and KASI (Republic of Korea), in cooperation with the Republic of Chile. The Joint ALMA Observatory is operated by ESO, AUI/NRAO and NAOJ.