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Solar System Observations in Early Science Cycle 0 with ALMA

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The Atacama Large Millimeter/submillimeter Array (ALMA) will be comprised of a giant array of 12-m antennas, with baselines up to 16 km and state-of-the-art receivers that cover all the atmospheric windows up to 1 THz. An additional, compact array of 7-m and 12-m antennas will greatly enhance ALMA's ability to image extended sources. The ALMA project is an international collaboration between Europe, East Asia and North America in cooperation with the Republic of Chile.

The Joint ALMA Observatory (JAO) expects to start Early Science observations (Cycle 0) on a best effort basis late in 2011 and a call for proposals will be issued at the end of the first quarter of 2011. The ALMA Early Science Cycle 0 capabilities will comprise sixteen 12-m antennas, receiver bands 3, 6, 7 & 9 (wavelengths of about 3, 1.3, 0.8 and 0.45 mm), baselines up to 250m, single field imaging, and a restricted set of spectral modes chosen to meet a reasonable range of scientific goals. Additional capabilities including somewhat longer baselines, limited mosaic imaging, and some polarization capabilities, may be announced in the Call for Proposals.

Even at the Cycle 0 phase, the sensitivity of ALMA in spectral observations is typically 10 - 30 times higher than that of the existing millimeter and submillimeter arrays. High spatial resolution, 0".35-2".5 dependent on observing frequency, and high spectral resolution will enable observers to image detailed features of planets and to reveal kinematics of planetary atmosphere. For example, 1 sigma sensitivity in brightness is less than 1 K with a velocity resolution of 0.1 km s⁻¹ and an angular resolution of 1" at 345 GHz. The ALMA data can be compared directly with theoretical studies enriching our understanding of the planetary science.

Successful proposers for Early Science Cycle 0 will share risk with ALMA. ALMA staff will conduct quality assurance on ALMA data, and will provide reduced data products through the respective ALMA Regional Centers (ARCs). However, it cannot be guaranteed that projects will be completed or that the characterization and quality of the data and data reduction will meet the standards expected when ALMA is in full scientific operations.

If your affiliation is in Japan, the East-Asia ALMA Regional Center located in the NAOJ campus in Tokyo will provide user support in many aspects. We present the ALMA Cycle 0 capabilities and its expected outcome for potential observers.

The key dates in the current plans for Cycle 0 are given below. It is still possible that changes in circumstances may make it necessary to alter them.

- 2011/03/31: CfP for ALMA Early Science Cycle 0 and release of offline Observing Tool.
- 2011/06/01: Opening of archive for proposal submission.
- 2011/06/30: Proposal Deadline.
- 2011/09/30: Start of ALMA Cycle 0 observing.

Keywords: ALMA, Radio Interferometer, Early Science