



# Planning for Science Verification and Early Science: Possible Timelines and Capabilities

<http://www.almaobservatory.org/en/announcements-events/230-alma-board-statement-on-early-science>

The following slides may be helpful for planning purposes

A final decision on timescale and capabilities will be made in Q1 2011  
as experience of antenna, instrument and infrastructure is gained





# Science Verification

Starting Jan 2011



## ★Goals:

- ★End to End Test of ALMA as a telescope before Early Science

- ★Provide images (and enthusiasm) to community

## ★Call for Suggestions

- ★Not full proposals, just a couple of paragraphs

- ★No full proposal review process, appropriate projects chosen by committee led by Project Scientist

## ★Data not proprietary

- ★Images released through EPO department

- ★Data available to any users who wish to try data reduction



# ALMA Early Science



- When?

- Preliminary finalized at the ALMA Board in Chile
  - Note Board statement: <http://www.almaobservatory.org/en/announcements-events/230-alma-board-statement-on-early-science>
- Call early spring 2011, deadline few months later
- Observations Fall 2011

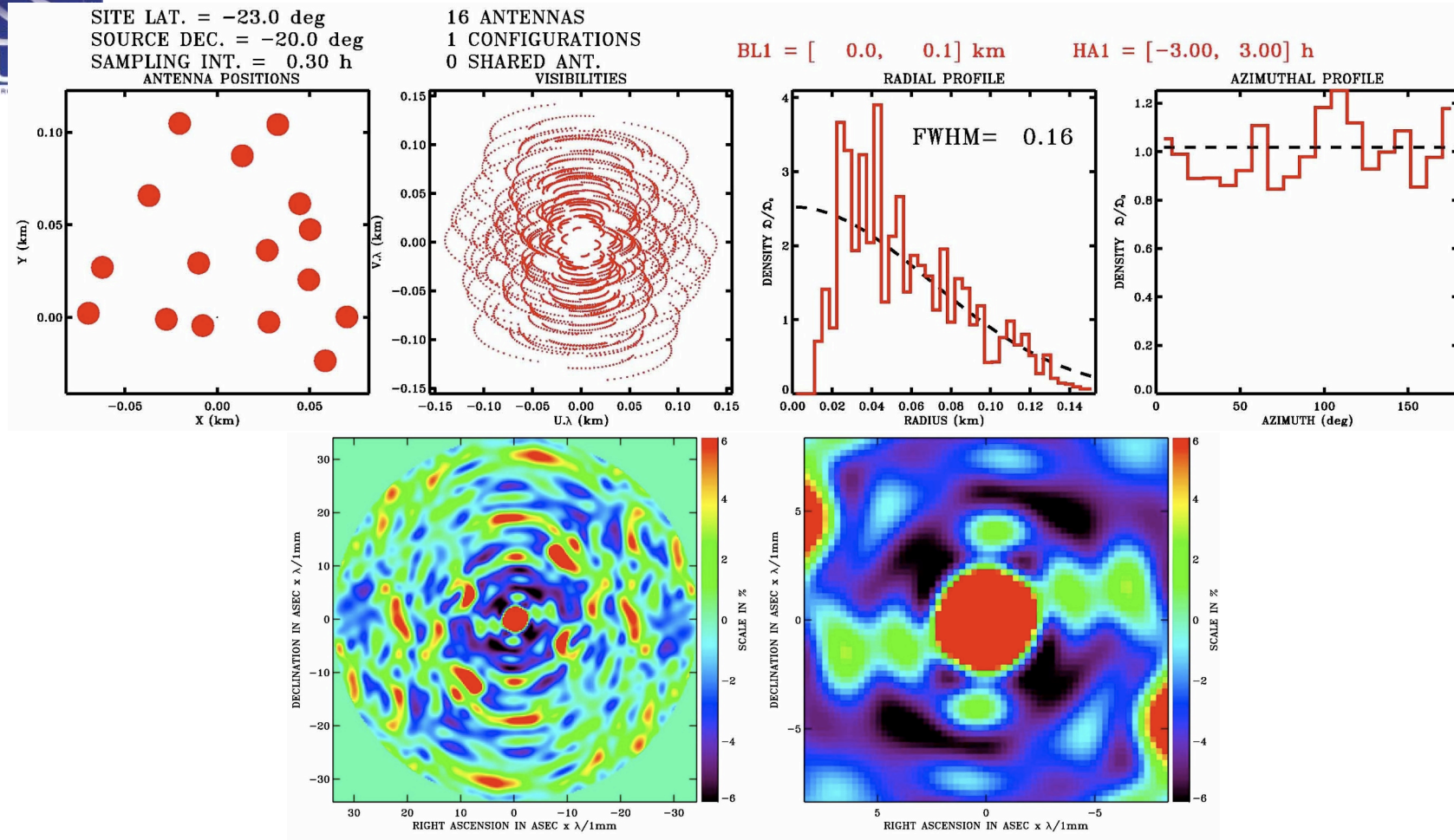
- What?

- 16 antennas, 2 compact configurations, single field interferometry
- Bands 3, 6, 7 and 9 (3mm, 1mm, 0.85mm, 0.45mm)
- Several single spectral resolution, full polarization correlator modes
- At most 30% of the available time for the first call (period Oct11-Jun12)
- Maybe baselines up to 500m, maybe small mosaics
- No Solar observations

Preliminary. To be confirmed in early 2011



# Configurations for Cycle 0



(F. Boone, Nov 2010)

- Two configurations with max baselines  $\sim 160$  and  $\sim 250$  meters
- Possibly an additional configuration with longer baselines, if infrastructure is available and tested



# Spectral modes for Cycle 0



FDM modes		Resolution (kHz)→							
Band-	MHz	7.6	15.3	30.5	61	122	244	488	977
width ↓	2000						1	2	4
	1000					1	2	4	
	500				1	2	4		
	250			1	2	4			
	125		1	2	4				
	62.5	1	2	4					

TDM modes		Resolution (MHz) →		
Band-	MHz	7.8	15.6	31.3
width	2000	1	2	4

The number in each cell shows the number of polarization products provided: 1 – single pol, 2 – both polarizations, 4 – Full Stokes.



# ALMA Early Science



- Limitations to be kept in mind:
  - Limited number of antennas:
    - limited sensitivity as compared to full ALMA
    - imaging requires Earth rotation synthesis
  - Limited angular resolution
  - No multi resolution available
  - Limited time available for science observations
  - ALMA capabilities ramping up FAST
  - ALMA ES capabilities and constraints are best suited for limited scope projects (as opposed to large scale surveys)
  - Typical project for ES should be few hrs (4-10) and deliver result!



# Preparation for Early Science Operations



# Early Science Operations



- The time will be shared between CSV and Science Operations.
- At least 33% of the remaining time (after discounting weather downtime and engineering time) should be available for the Early Science observations.
- Scheduling of observing time during Early Science is done by DSO in coordination with CSV
- Scheduling of SBs will be done by the dynamic scheduler, used in manual mode. The algorithm will be optimised during Early Science Operations based on the manual selections and their outcome. It is expected that fully automated dynamic scheduling will be in operations by the end of this period.
- The Science Pipeline will not be ready to produce reliable data at this time, and further development will continue during Early Science Operations. The data taken during Early Science will be calibrated and quality assured by DSO and ARC staff (on turno), supported by CSV, using and developing data reduction scripts that will be used by the pipeline and delivered to the PIs.





# Science Operations Implementation



- **Soft start**
  - SV data release must precede Early Science CfP (call for ideas in January)
  - Compressed Proposal Assessment period
  - A shorter Early Science first period (8 months) with well defined capabilities.
  - Early Science as Best Effort approach
- **Single set of capabilities (no phases or tiers)**
- **Strawman Timeline**
  - Call for Proposals Q1 2011
  - Proposal Deadline: Q2 2011
  - Start of Early Science observations: autumn 2011, for a period of 8 months

Preliminary To be confirmed in early 2011



# Best Efforts



- Limited set of capabilities
- Limited time available for Early Science
- Aim to complete projects, if necessary at the expense of the number of projects started, but not guaranteed
- JAO will conduct Quality Assurance to a lesser extent than in full operations
- PIs will need to contribute to data processing and to Quality Assurance



# Optimal projects for Cycle 0



- Well matched to Cycle 0 capability
- Scientifically worthwhile & publishable outcomes from Cycle 0 observations
- Produce images/spectra from observations of a few hours or less
- Exploit ALMA's unique capabilities



# Preparations of the ALMA User Community



Tutorials are provided by the ARCs:

- Tutorials in CASA (already started)
- Tutorials in proposal preparation and submission (using the OT)

Involvement of the User Community:

- Participation in CSV and Science Operations preparations through the JAO visitor's program.

Access to data before Early Science:

- Science verification data

User documentation (good progress):

- Training Material: will be available from the [www.almaobservatory.org](http://www.almaobservatory.org)
- Training Activities (workshops, tutorials, demonstrations):  
<http://wikis.alma.cl/bin/view/DSO/ListTrainingActivities>