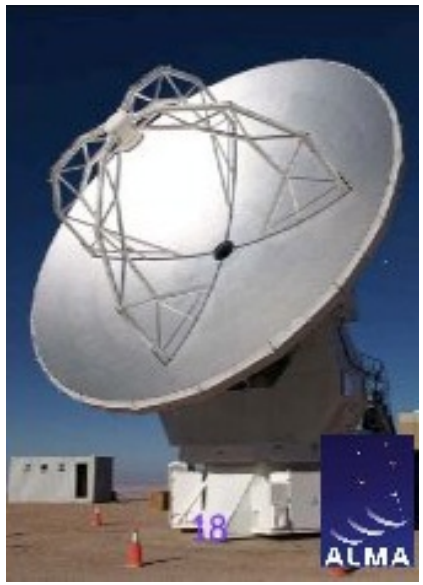
ALMA

and the Italian

ALMA Regional Centre (ARC)

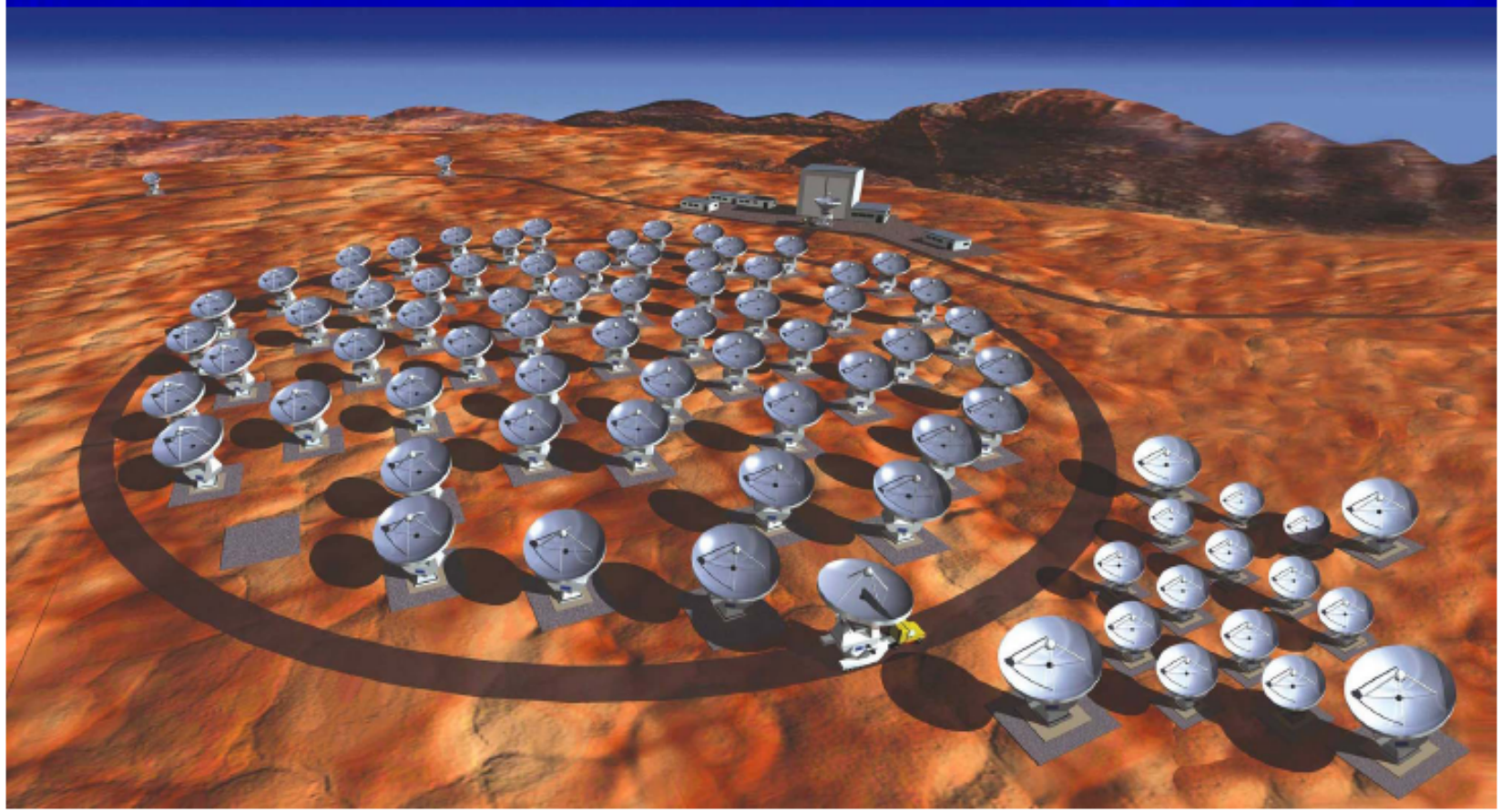


Jan Brand

Coordinator Italian ARC

INAF - Istituto di Radioastronomia, Bologna

ALMA + ACA →
Atacama Large Millimeter/submillimeter Array

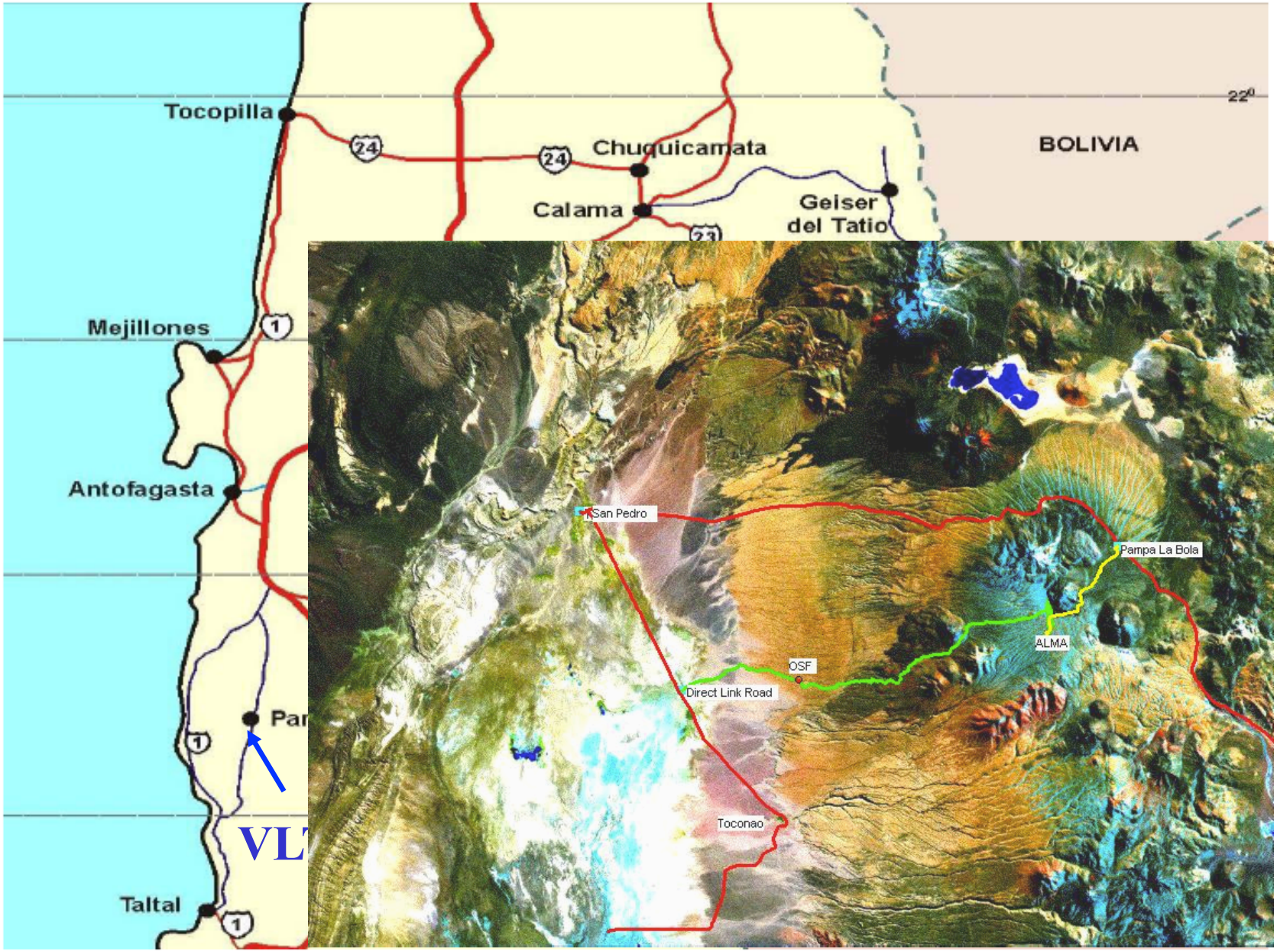


ALMA Project – Structure

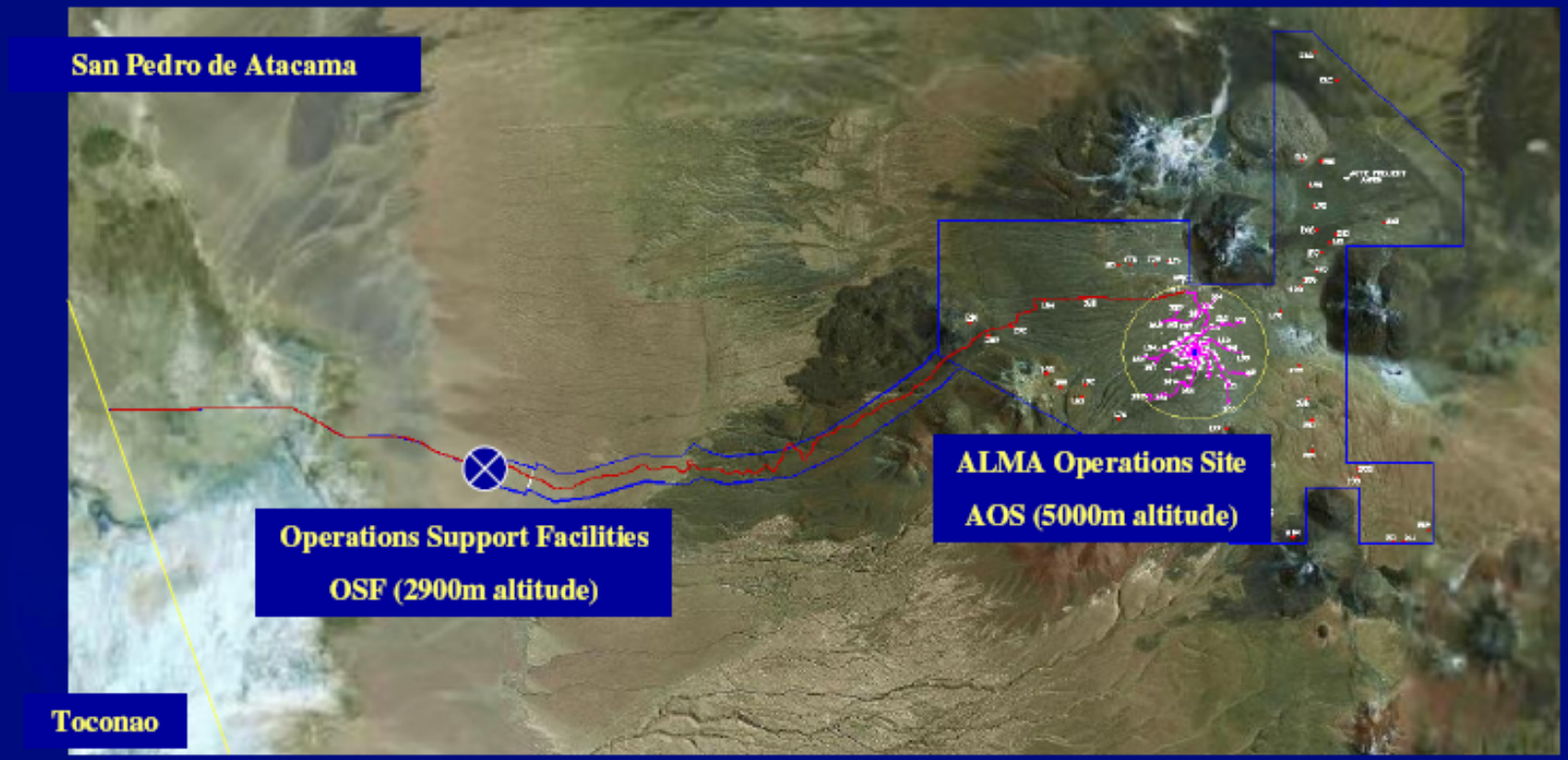
- Partners:
  - **Europe** - *European Organization for Astronomical Research in the Southern Hemisphere - ESO.*
  - **North America** - *National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC) – AUI/NRAO*
  - **Chile**
  - **Japan/Taiwan** - *National Institutes of Natural Sciences (NINS), in cooperation with the Academia Sinica in Taiwan - NAOJ*

→ Joint ALMA Office: Construction project
→ Joint ALMA Observatory


Ecuador
Peru
Brazil
Lima
La Paz
Bolivia
Paraguay
Asunción
Chile
Uruguay


Tocopilla
24
24
Chuquicamata
Calama
Geiser
del Tatio
BOLIVIA
22°
Mejillones
1
Antofagasta
San Pedro
Pampa La Bola
ALMA
OSF
Direct Link Road
Toconao
1
Par
VL
Taltal
1

ALMA Site

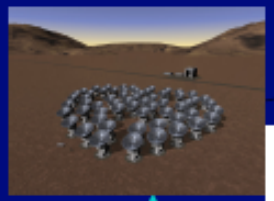

San Pedro de Atacama
Operations Support Facilities
OSF (2900m altitude)
ALMA Operations Site
AOS (5000m altitude)
Toconao


ALMA Sites
To AOS (43km)
OSF Site (15km)

ALMA Sites

- **Array Operations Site – AOS** – Antennas, correlator, reconfiguration. 5 km
- **Operations Support Facility – OSF** – Array operation, equipment maintenance 2.9 km
- **Santiago Central Offices – SCO** – Administration, scientific support. sea level
- **ALMA Regional Centers – ARCs + ARClets** – interfaces to astronomy community

ALMA Sites in Chile



Antenna Operations Site (AOS)

40 MB/s (peak)

Operation Support Facility (OSF)

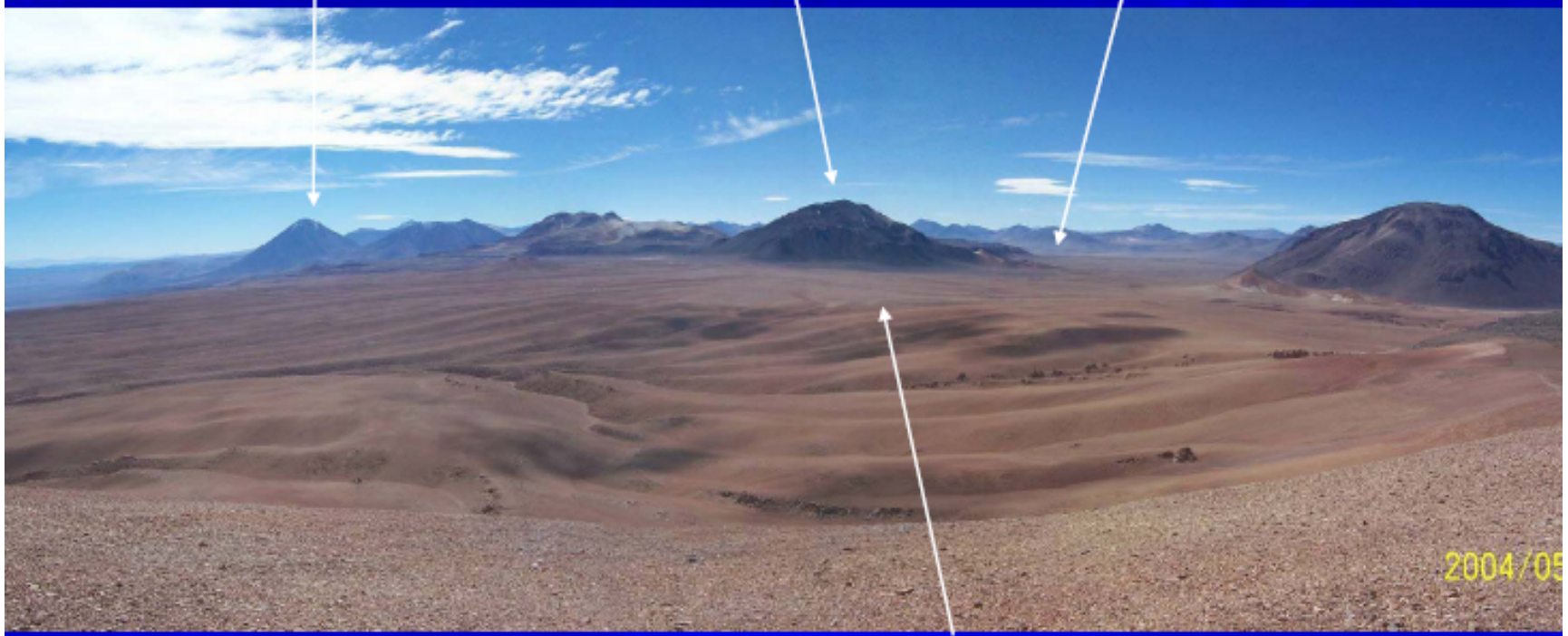
6 MB/s (average)

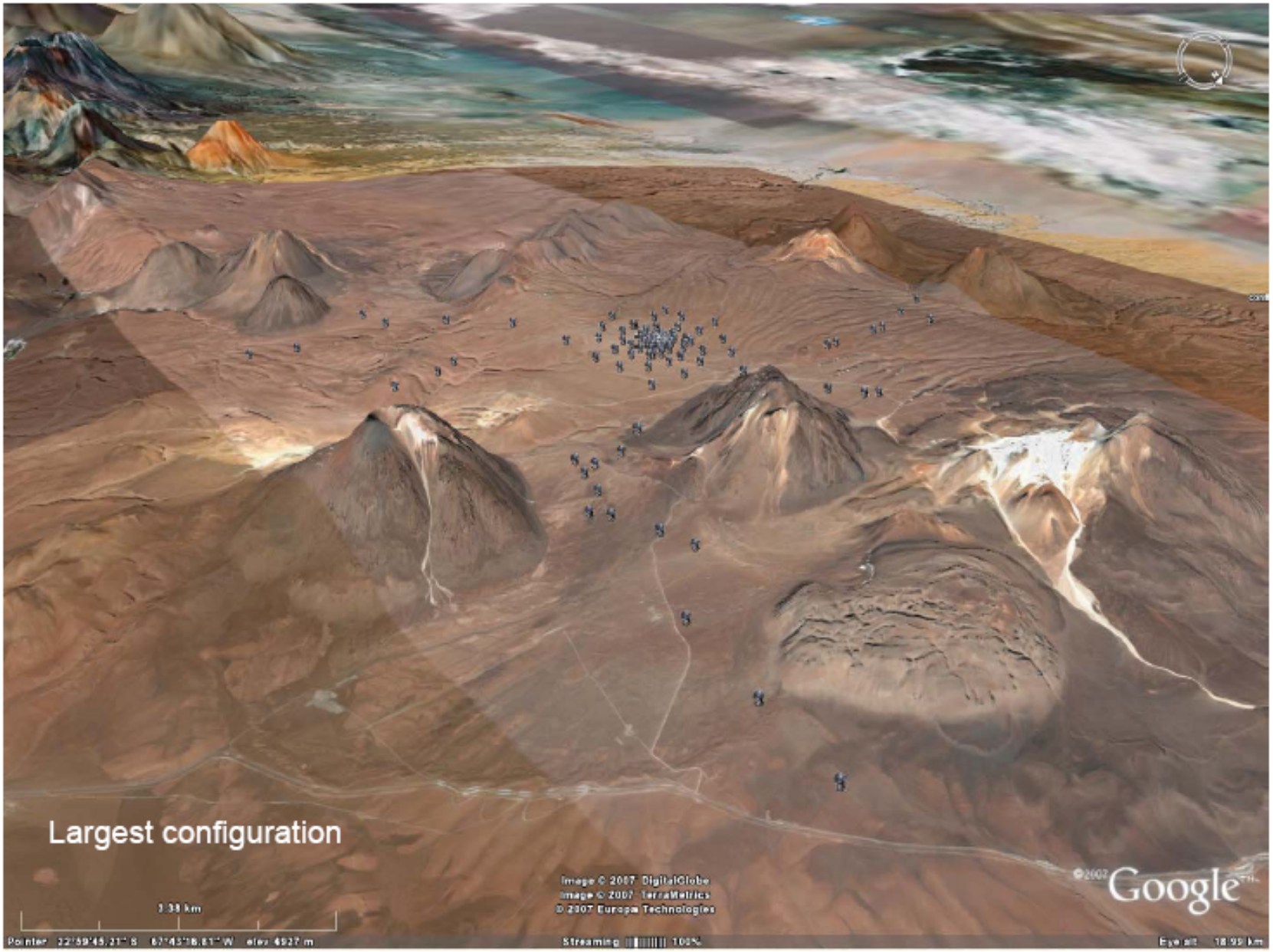
Santiago Central Office (SCO)

5000m Chajnantor plateau – looking south

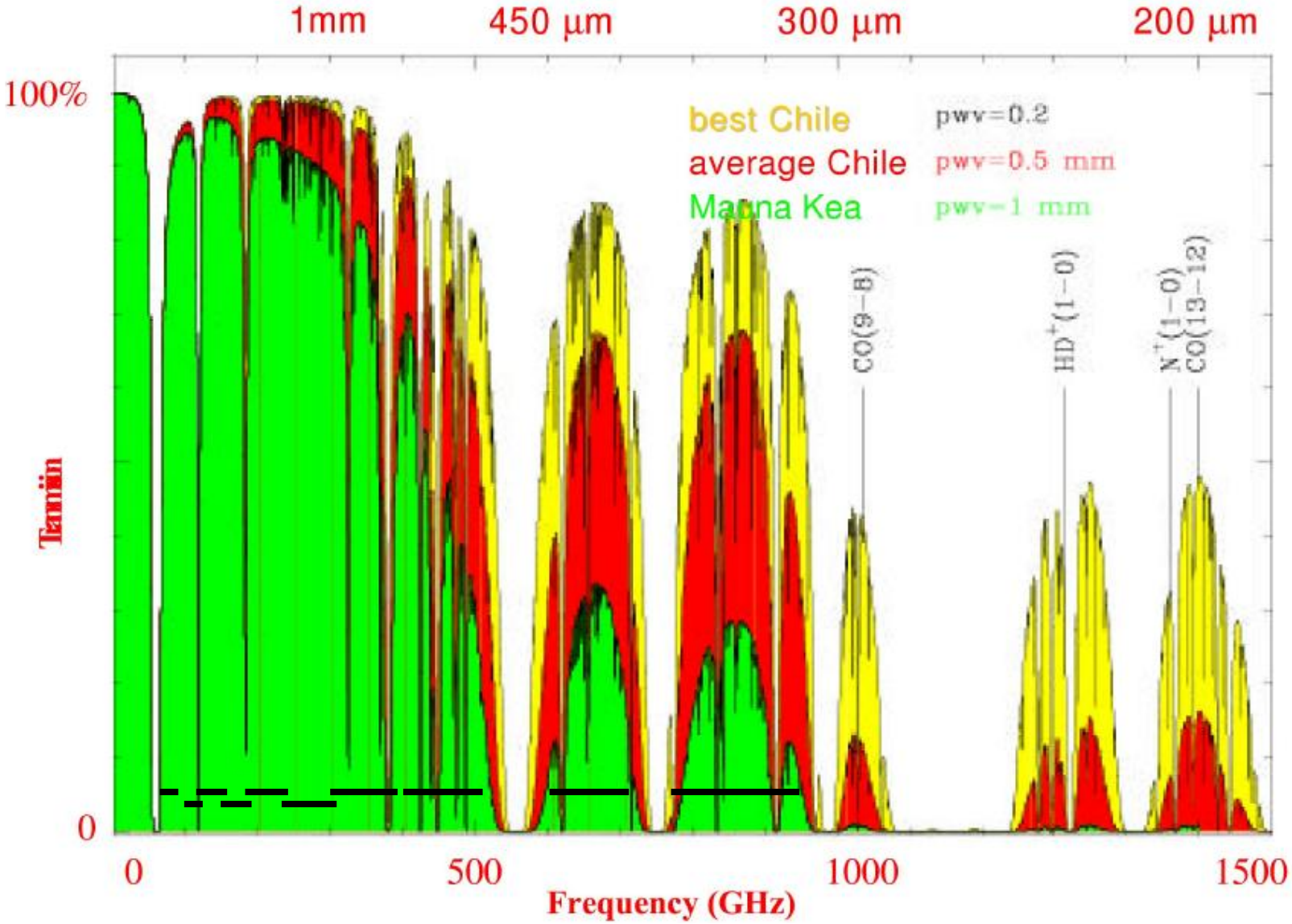
Array Operations Site

Chajnantor Plateau – looking north




Largest configuration
Image © 2007 DigitalGlobe
Image © 2007 TerraMetrics
© 2007 Europa Technologies
©2007 Google
3.38 km
Pointer 22°59'45.21" S 67°45'16.81" W elev 4927 m
Streaming 100%
Eye alt 18.99 km

Atmospheric Transmission



ALMA Science Requirements

Three “level I” science goals:

- *Spectral line CO/C+ in z=3 MWG < 24hrs*
- *resolve PPD at 150 pc – gas/dust/fields*
- *Precise 0.1” imaging above 0.1% peak*

- High Fidelity Imaging.
- Routine sub-mJy Continuum / mK Spectral Sensitivity.
- Wideband Frequency Coverage.
- Wide Field Imaging Mosaicing.
- Submillimeter Receiver System (..& site..).
- Full Polarization Capability.
- System Flexibility (hardware/software).

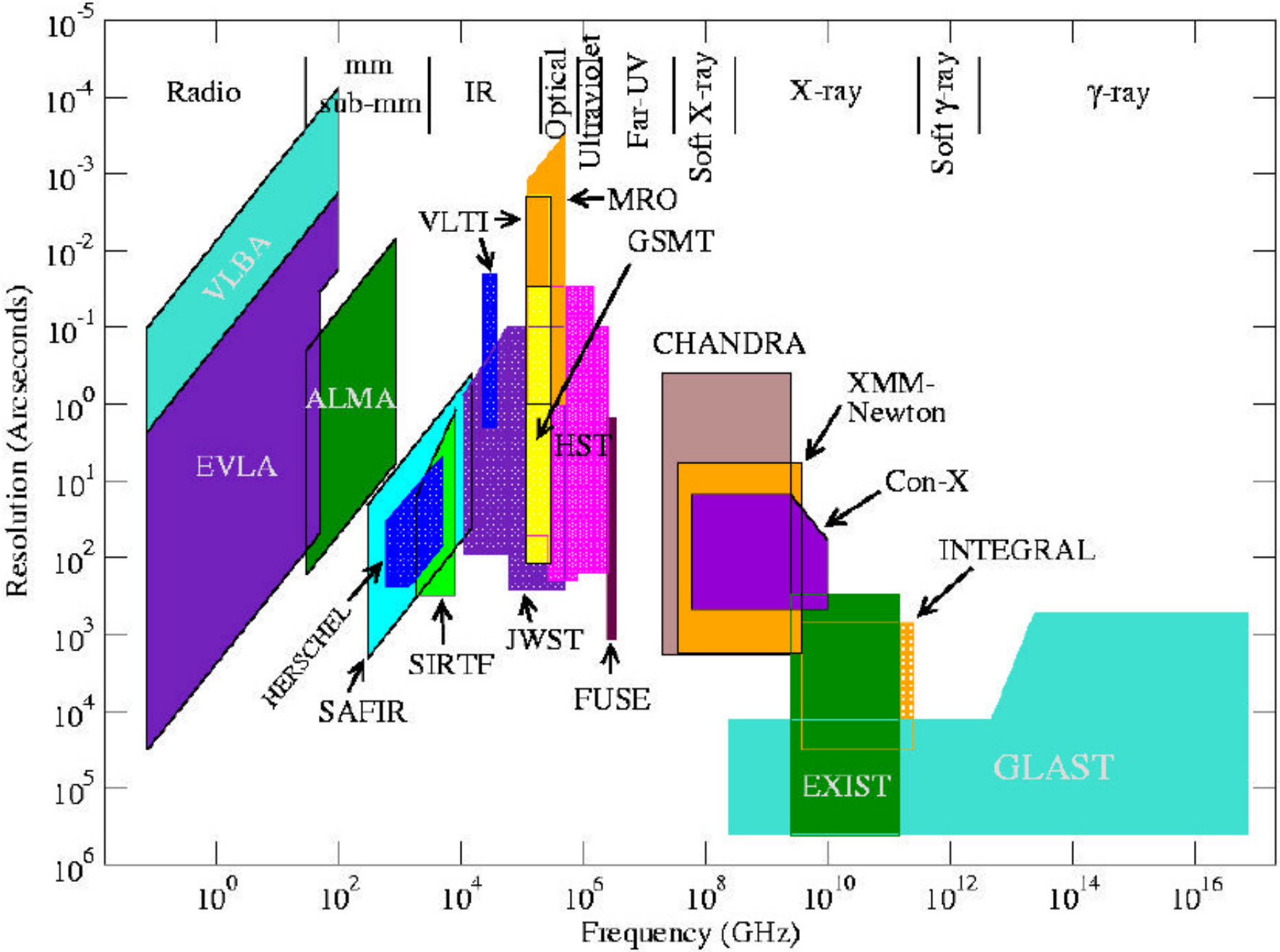
⇒ ALMA Technical Specifications

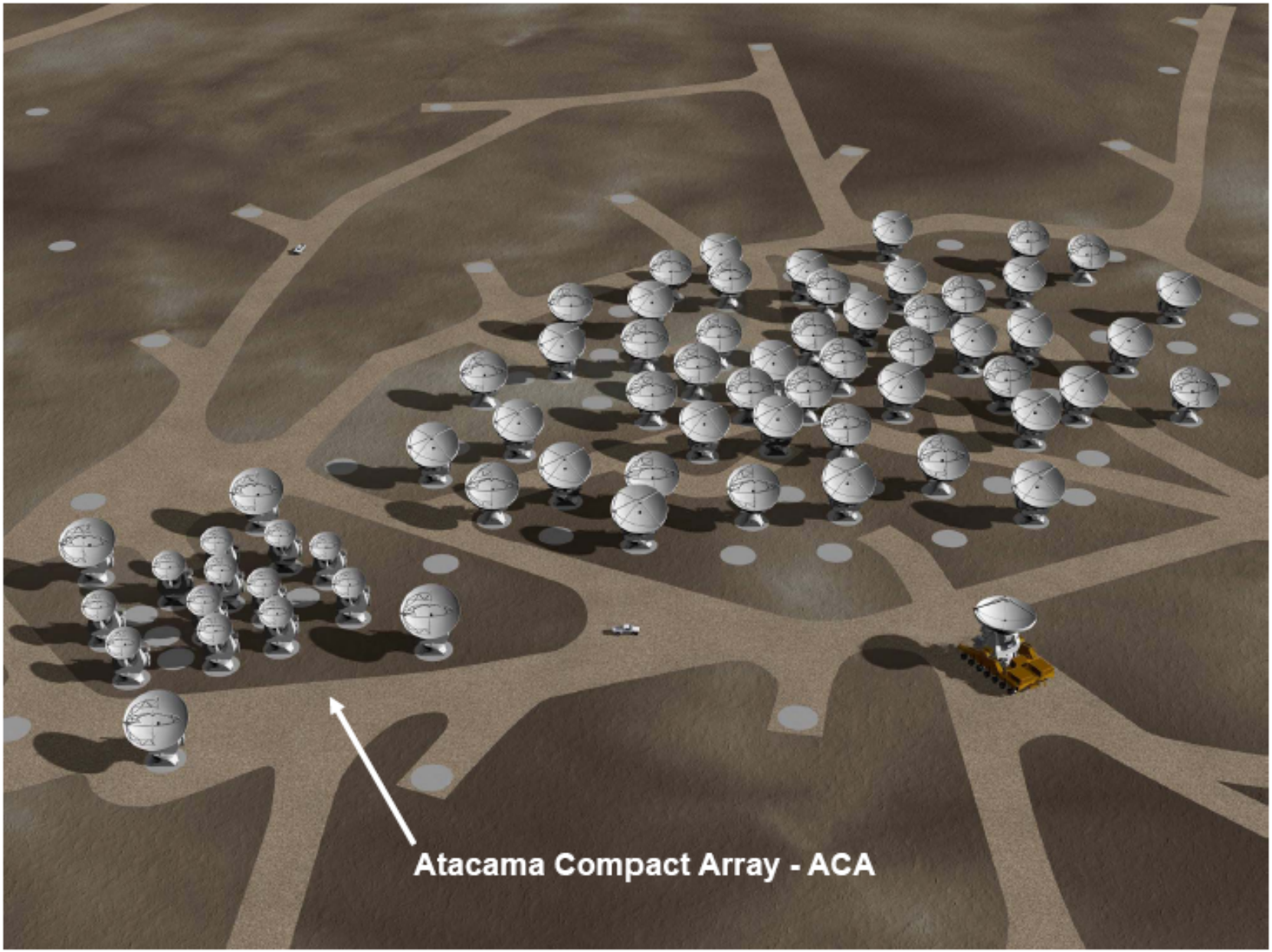
- 54 12-m antennas, 12 7-m antennas, at 5000 m altitude site, desert environment.
- Antennas: Surface accuracy ±25 μm, 0.6" reference pointing in 9m/s wind, 2" absolute pointing all-sky.
- Array configurations between 150m to ~15 -18km.
- 10 bands in 31-950 GHz + 183 GHz WVR. Initially:

❖86-119 GHz	"3"	3 mm
❖125-169 GH	"4"	2 mm
❖211-275 GHz	"6"	1.3 mm
❖275-370 GHz	"7"	0.85 mm
❖385-500 GHz	"8"	0.65 mm
❖602-720 GHz	"9"	0.45 mm
❖787-950 GHz	"10"	0.35 mm

ALMA Technical Specifications

- 8 GHz BW, dual polarization.
- Flux sensitivity ~0.2 mJy in 1 min at 345 GHz
- Interferometry, mosaicing & total-power observing.
- Correlator: 4096 channels/IF (multi-IF), full Stokes.
- Data rate: 6MB/s average; peak 60-150 MB/s.
- All data archived (raw + images), pipeline processing.


Radio
mm
sub-mm
IR
Optical
Ultraviolet
Far-UV
Soft X-ray
X-ray
Soft γ-ray
γ-ray
VLBA
EVLA
ALMA
VLTI
MRO
GSMT
HST
CHANDRA
XMM-
Newton
Con-X
INTEGRAL
HERSCHEL
SAFIR
SIRTF
JWST
FUSE
EXIST
GLAST
Resolution (Arcseconds)
Frequency (GHz)


Atacama Compact Array - ACA

Role of ACA

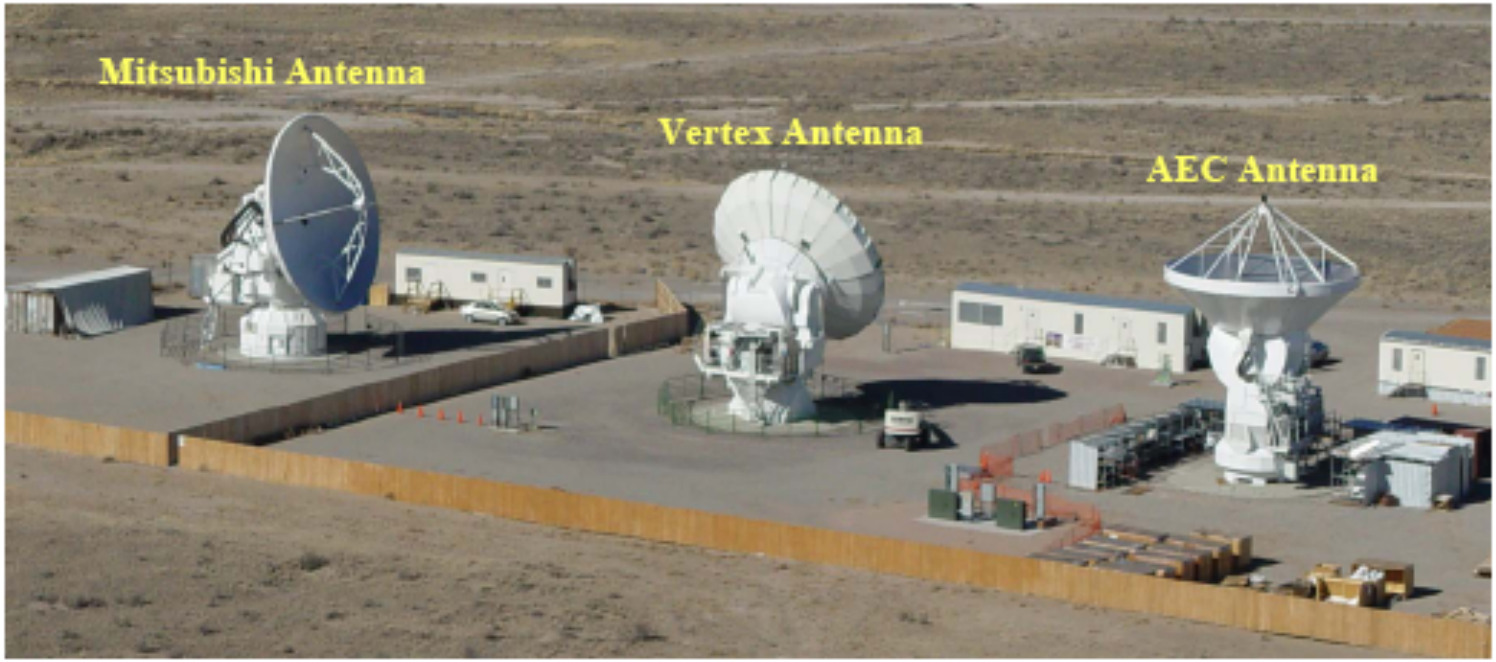
- **Supplement the 50-element array data with**
  - **Short baseline data (7-m antennas)**
  - **Total power data (12-m antennas)**

  ⇒***Enhance fidelity of ALMA images***
  (overcome "*missing-flux*" problem)

- **Stand-alone mode of operation**

  ⇒Available for ***target-of-opportunity*** observations, wide-field surveys, etc.

The Three ALMA Prototype Antennas at the ATF

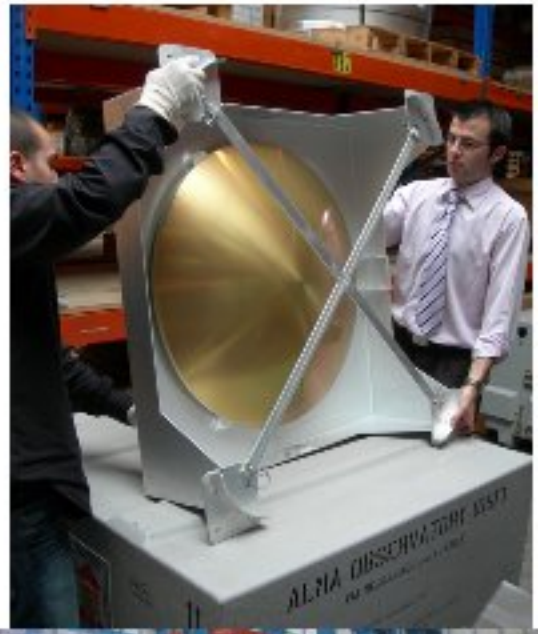


12 Meter Diameter, Carbon Fiber Support Structures



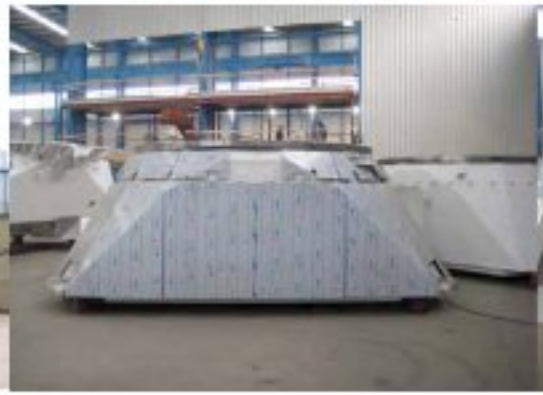






ALMA OBSERVATORY






Antenna Performance

uid X43 X19d4 X1 – uid X43 X19d4 X1

RF: Uncal – *01–AUG–2008 00:13:49 – almaproc@oper02 – ALMA01 – ALMA/Vertex 12–m Pro* @

Am: Rel.(B) ATFTower test scans 2 to 270 (01–AUG–2008) Elev: 9.73

Ph: Rel.(B)

rms Pha.

12 0.00

Edge taper = 18.23x 16.61 dB – offset X= –0.02 Y= –0.02 m

Focus offsets (X,Y,Z) = –0.30 0.12 6.90 mm; Astigmatism = 0.00 mm

Phase rms (unweighted)= 0.056 (weighted)= 0.047 radians

Surface rms (unweighted)= 12.80 – (weighted)= 10.85 μm

η_A(104.020 GHz) = 0.870; η_A(230.0 GHz) = 0.863; η_A(345.0 GHz) = 0.851

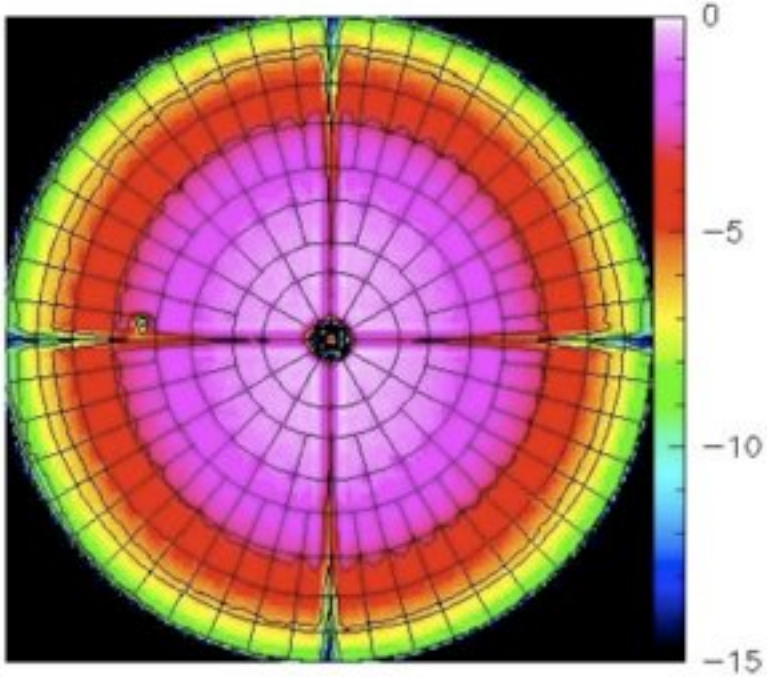
S/T(104.020 GHz)= 28.050 Jy/K; S/T(230GHz)= 28.290 Jy/K; S/T(345 GHz)= 28.661 Jy/K

η_l= 0.872 –η_S= 0.865 –η_P(104.020 GHz)= 0.998 –η_P(230 GHz)= 0.989 –η_P(345 GHz)= 0.976

Rms/ring: 11.8 8.88 9.63 7.42 8.46 8.37 10.4 20.9

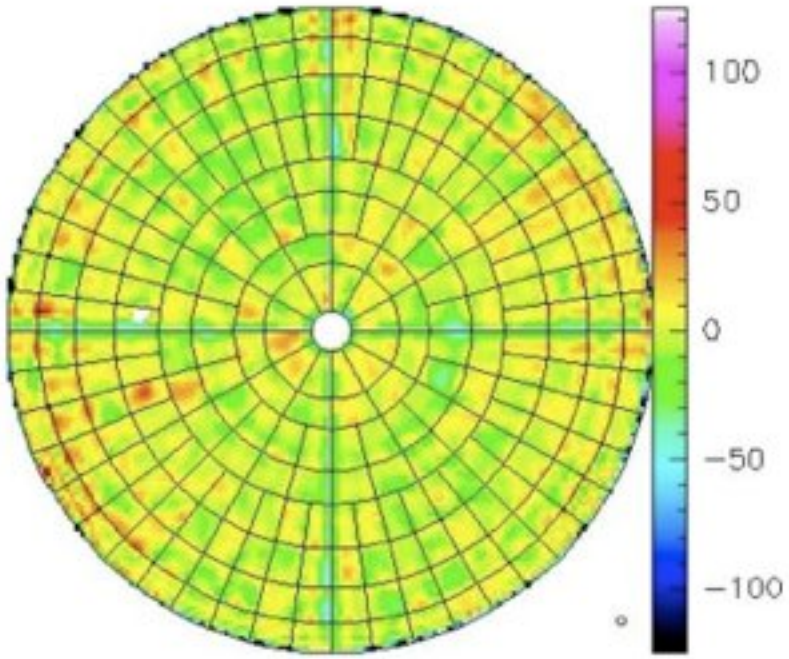
Amplitude (front view)

–15.000 to 0.000 by 3.000



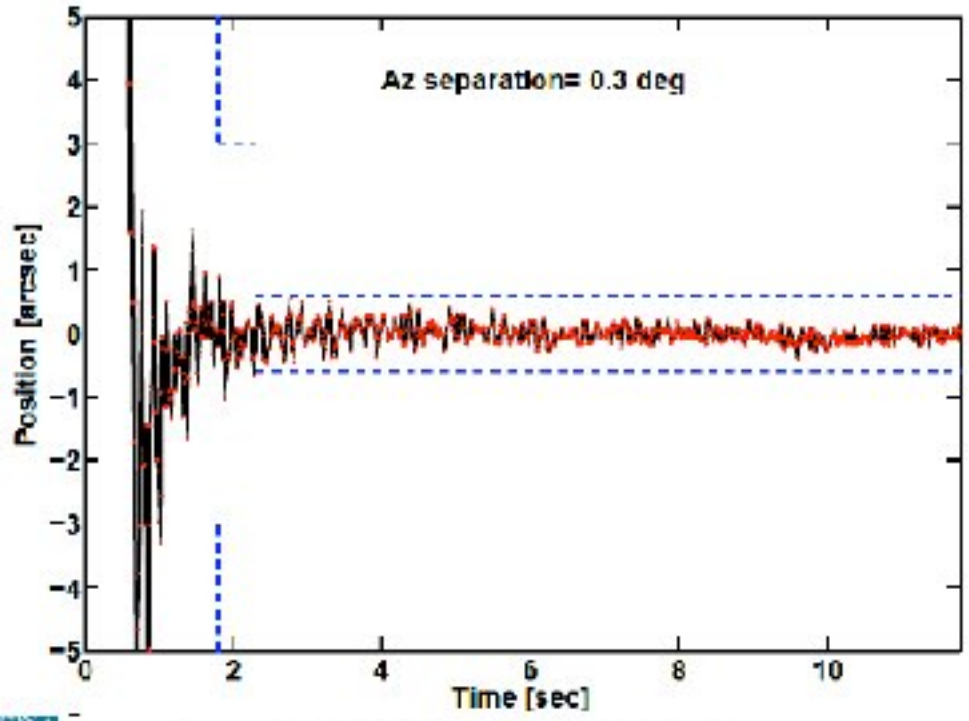
Normal errors (front view)

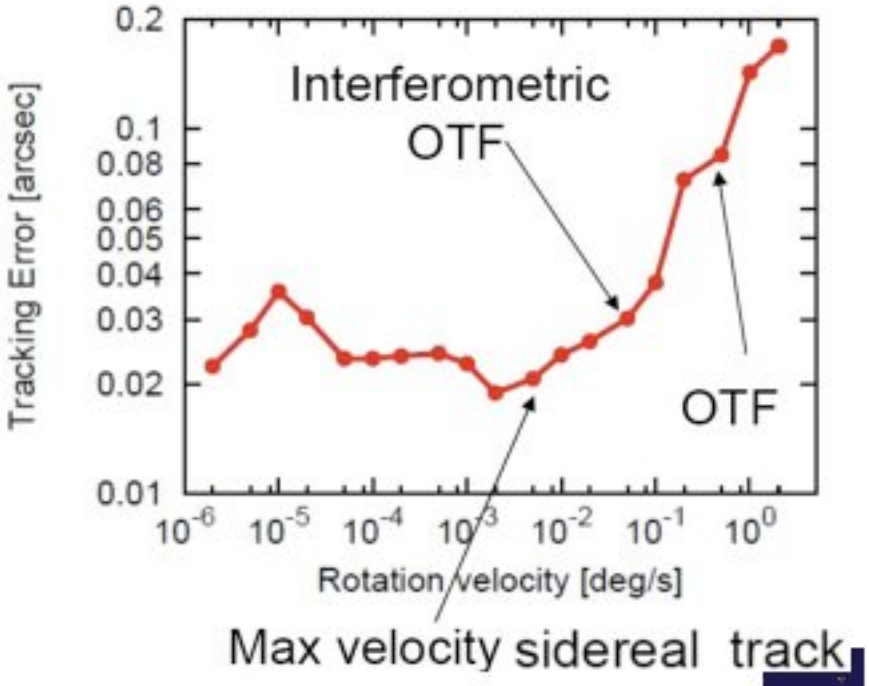
–125.000 to 125.000 by 50.000



Antenna Performance

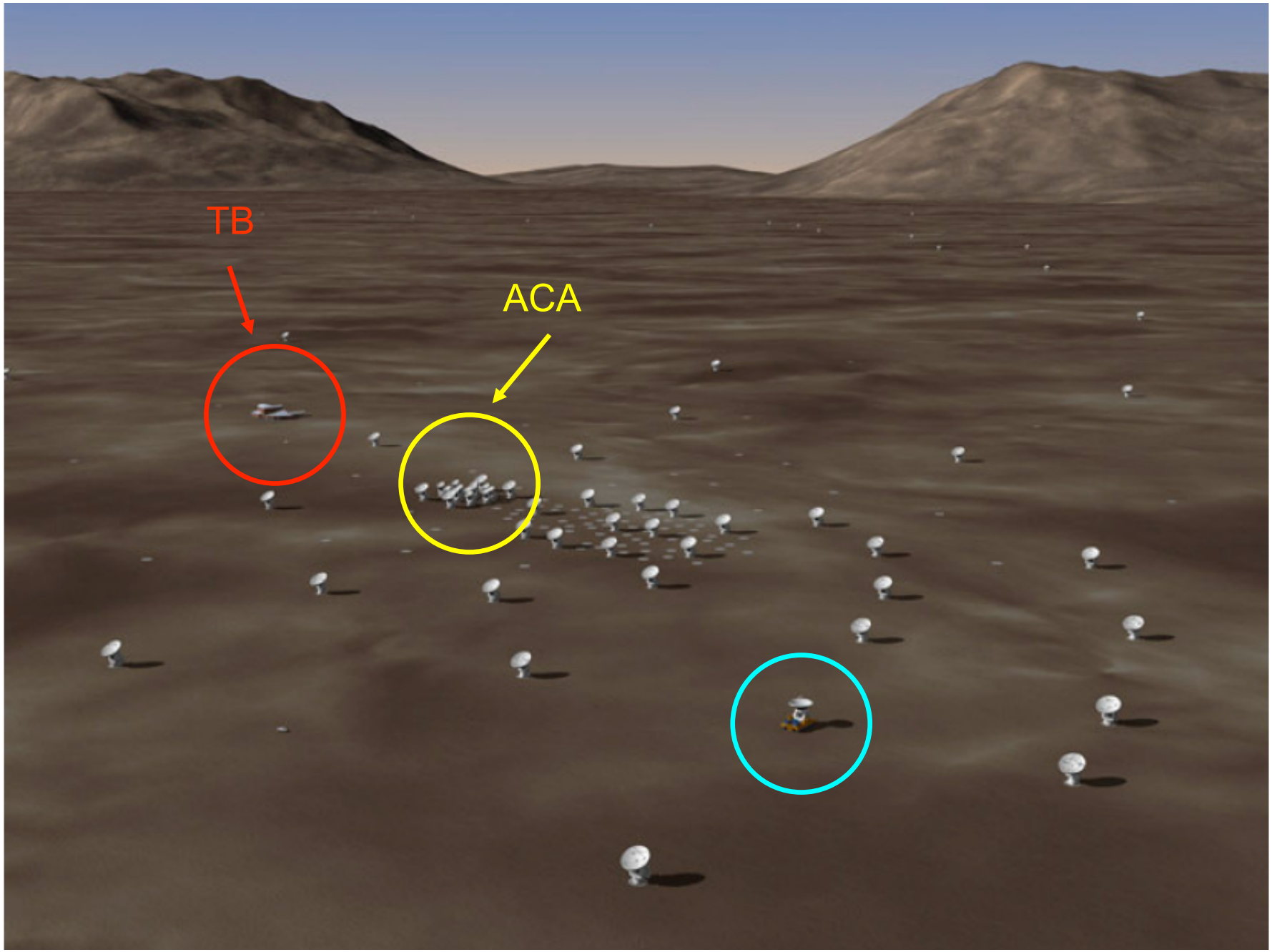
- Antennas under testing are showing excellent performance
  - Excellent pointing and tracking



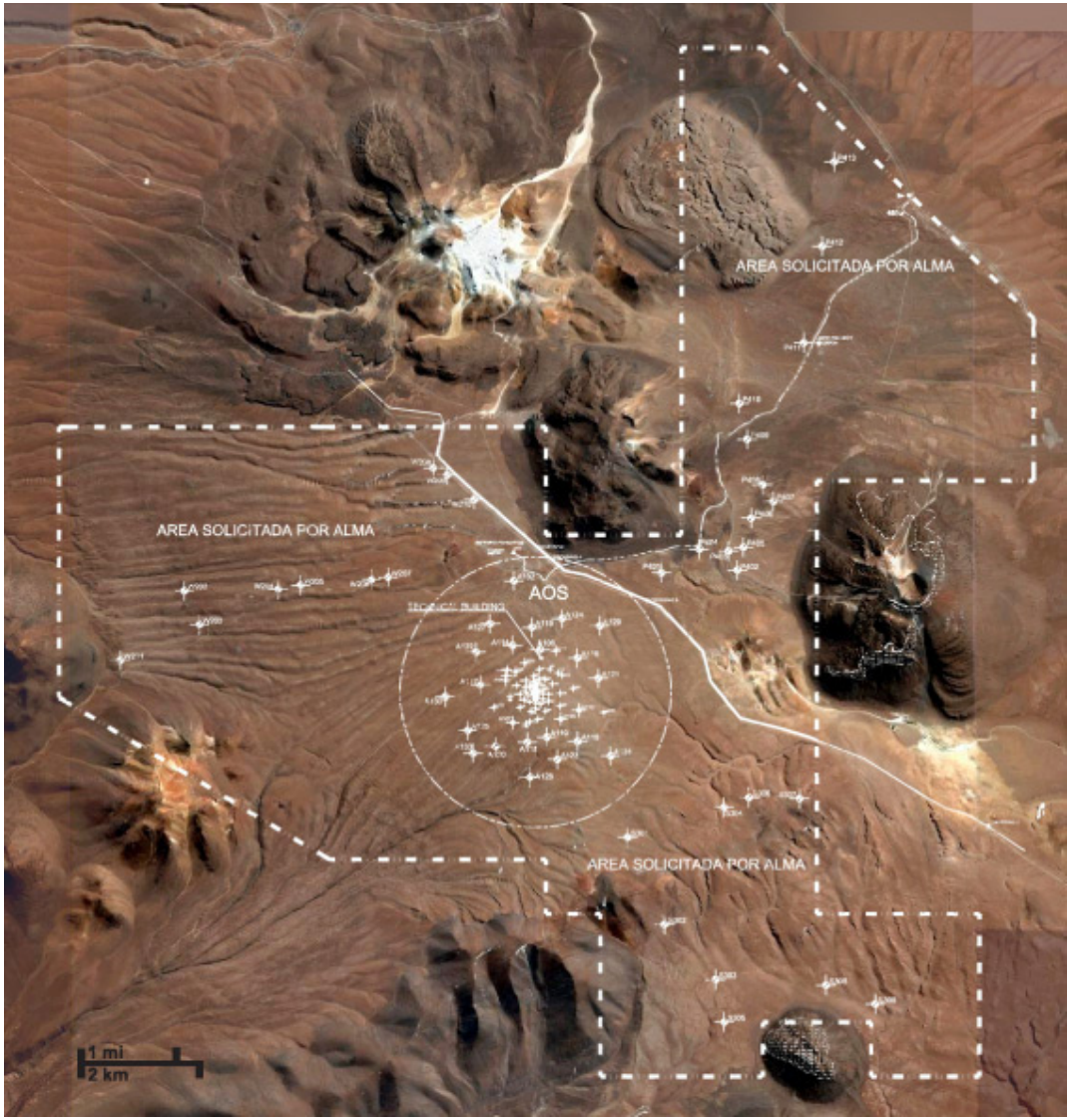


The ALMA Antenna Transporter

ESO Press Photo 45b/07 (5 October 2007)


TB
ACA

ANTENNA FOUNDATIONS LOCATIONS



ANTENNA FOUNDATIONS (ACA)


AOS Correlator Room


ACA Correlator Room


ACA Correlator – Oct '07

Operations Support Facility - 2900m


Operations Support Facility - OSF


OSF – Feb 2008


Array Control Room/OSF – Feb 2008


Contractor areas


Vertex Contractor Area


Vertex #1: August 2007

Vertex #2,3: Jan 2008

Front End Specifications

- Preliminary results within parentheses are referred to the vacuum window and do not include noise from optics losses

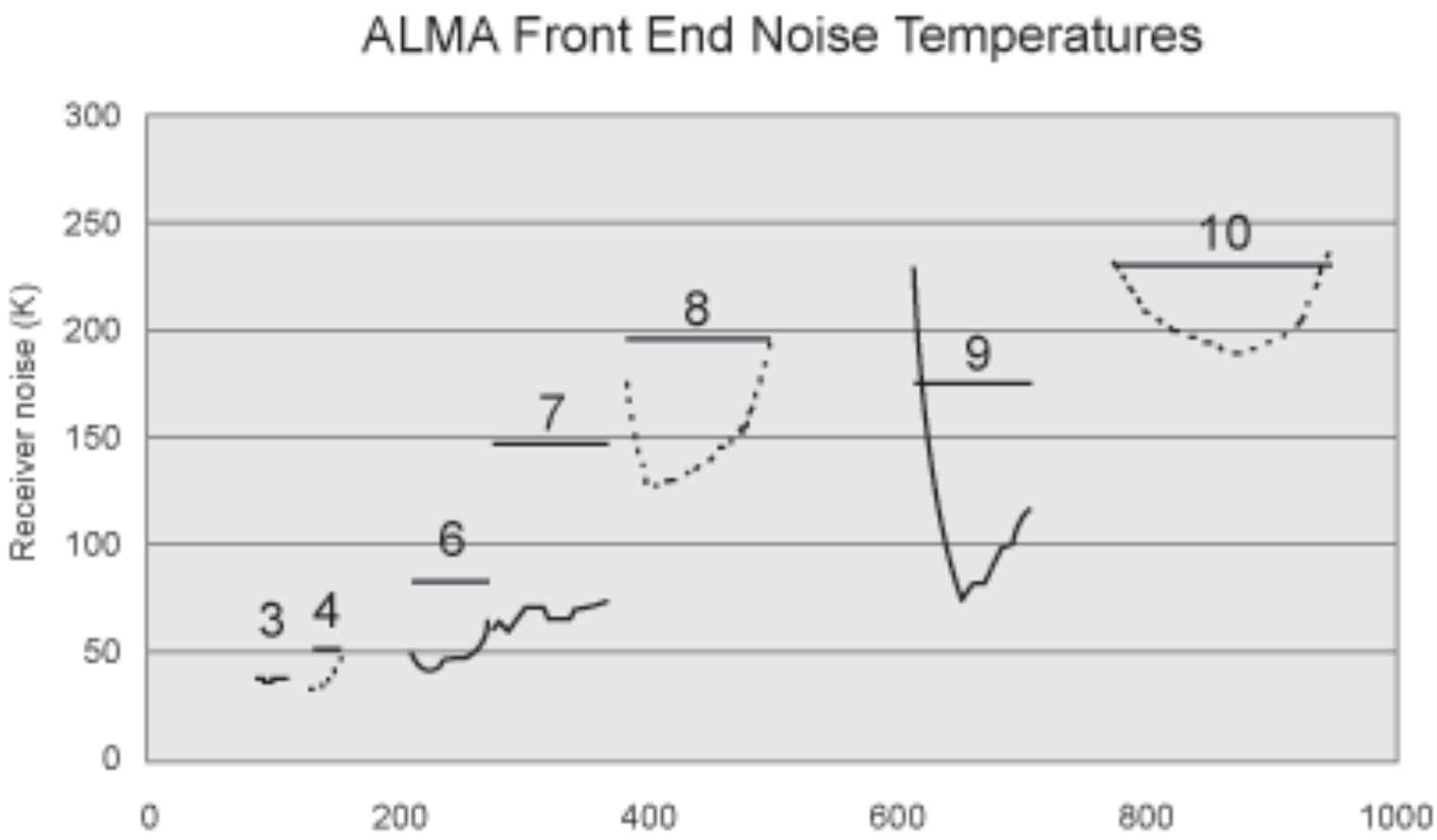
ALMA Band	Frequency Range	Receiver noise temperature		Mixing scheme	Receiver technology	Supplier
		T_{Rx} over 80% of the RF band	T_{Rx} at any RF frequency			
1	31.3 – 45 GHz	17 K	28 K	USB	HEMT	Not assigned ***
2	67 – 90 GHz	30 K	50 K	LSB	HEMT	Not assigned
3	84 – 116 GHz	37 K (40K)	62 K (50K)	2SB	SIS	HIA
4	125 – 169 GHz	51 K (45K)	85 K (~55K)	2SB	SIS	NAOJ
5	163 - 211 GHz**	65 K	108 K	2SB	SIS	OSO
6	211 – 275 GHz	83 K (40K)	138 K (60K)	2SB	SIS	NRAO
7	275 – 373 GHz*	147 K (75K)	221 K (100K)	2SB	SIS	IRAM
8	385 – 500 GHz	196 K (160K)	294 K (~270K)	2SB	SIS	NAOJ
9	602 – 720 GHz	175 K (120K)	263 K (150K)	DSB	SIS	NOVA
10	787 – 950 GHz	230 K	345 K	DSB	SIS	NAOJ ?

* - between 370 – 373 GHz T_{rx} is less than 300 K

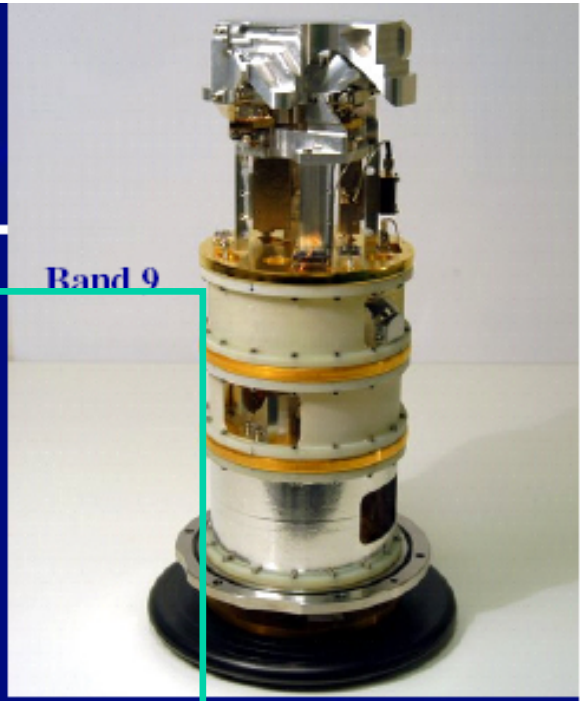
** - Limited to 6 units, funded by the EC under FP6

*** - Under consideration by U. Chile

- Dual, linear polarization channels:
  - Increased sensitivity
  - Measurement of 4 Stokes parameters
- 183 GHz water vapour radiometer:
  - Used for atmospheric path length correction


ALMA Front End Noise Temperatures
Receiver noise (K)
300
250
200
150
100
50
0
0
200
400
600
800
1000
3
4
6
7
8
9
10

Cartridge Production

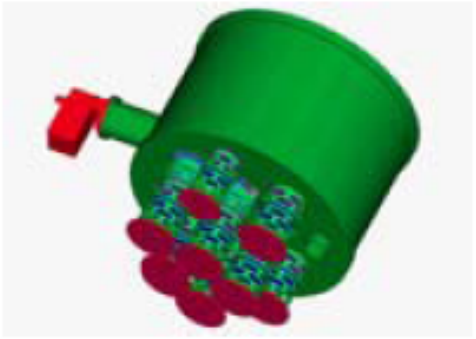


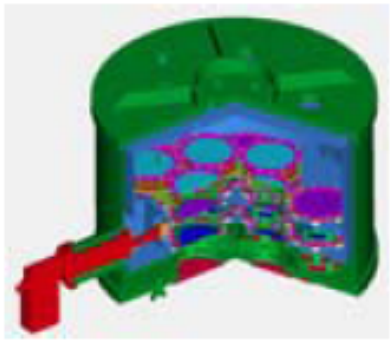
- Band 3 (HIA, Canada) 3 mm 86-119 GHz
- Band 6 (NRAO, USA) 1.3 mm 211-275 GHz
- Band 7 (IRAM, France) 0.85 mm 275-370 GHz
- Band 9 (NOVA, The Netherlands) 0.45 mm 602-720 GHz

- Band 4 (NAOJ, Japan) 2 mm 125-169 GHz
- Band 8 (NAOJ, Japan) 0.65 mm 385-500 GHz
- Band 10(NAOJ, Japan) 0.35 mm 787-950 GHz

Available from start

Front End Design

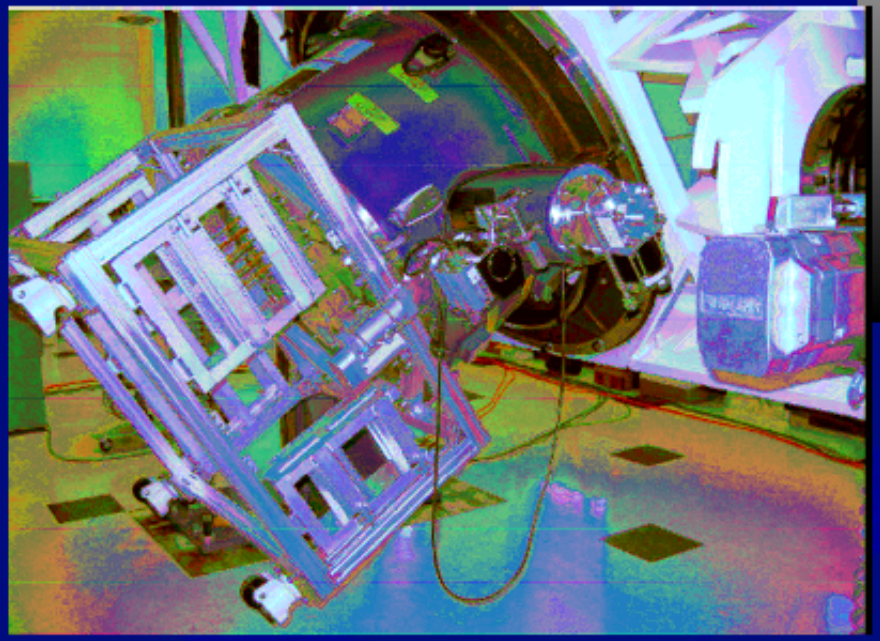


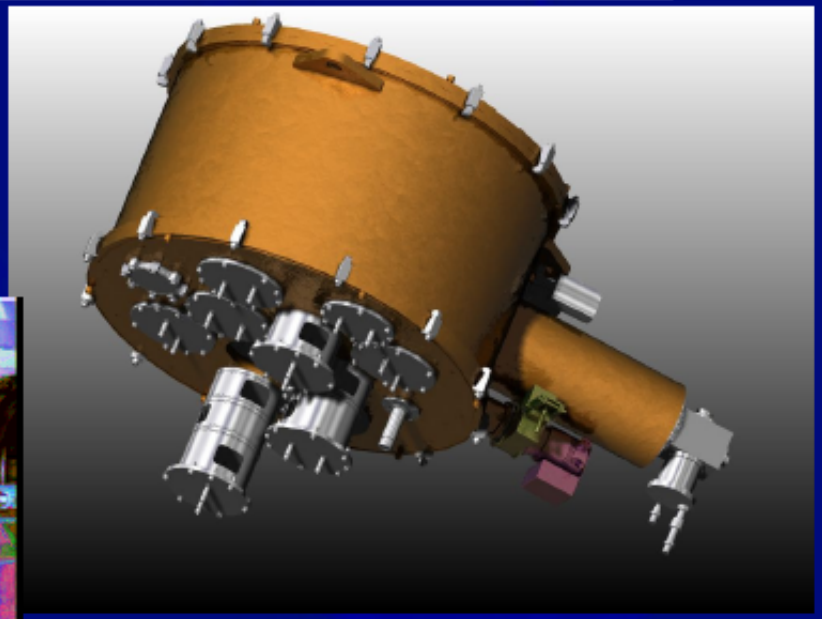


- Diameter ~ 1 m
- External optics top of dewar
- 10 Cartridges plugged from bottom
- Each cartridge contains one frequency

Front-end

First cryostat in integration center

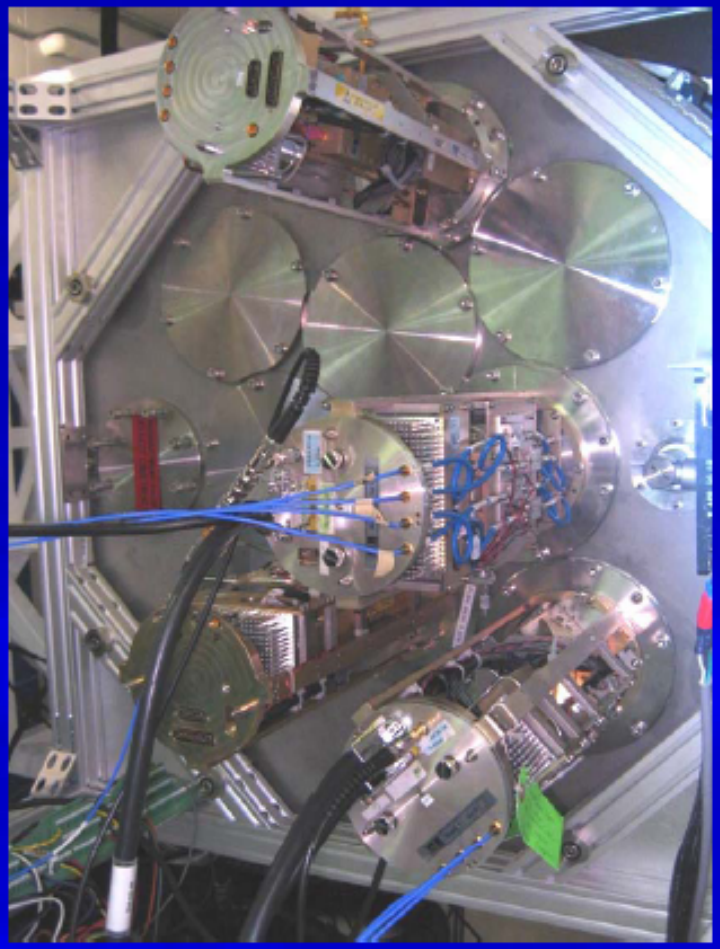




Receiver cartridge concept

FE #1 (4 cartridges)

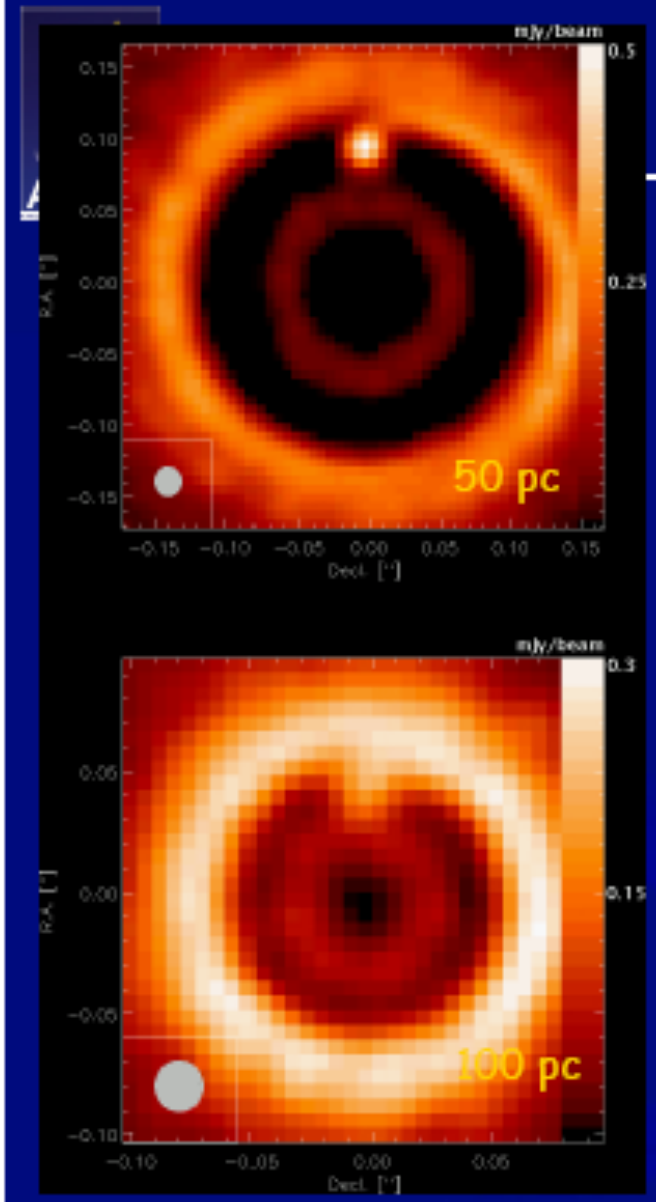
Band 3



Band 7

Band 9

Band 6



ALMA Key science 1: Planetary regions, nearby disks

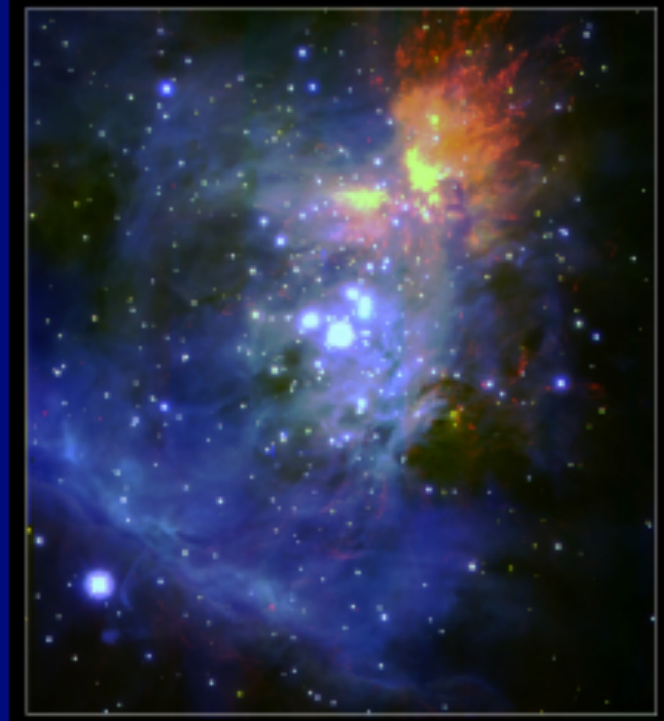
$M_{planet} / M_{star} = 0.5\ M_{Jup} / 1\ M_{sun}$

Orbital radius: 5 AU

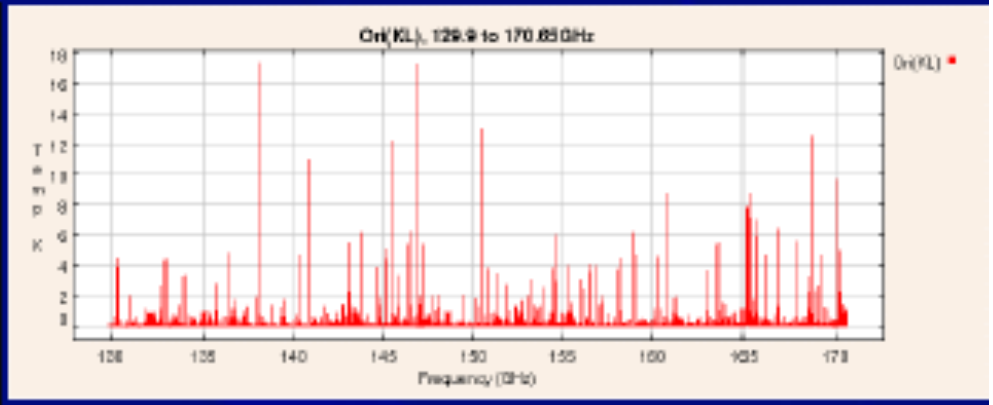
Disk mass as in the circumstellar disk around the Butterfly Star in Taurus

(ALMA: 10km, t_{int}=8h, 30º phase noise)
Wolf & D'Angelo (2005)
astro-ph / 0410064

ALMA Key Science 2: Astrochemistry



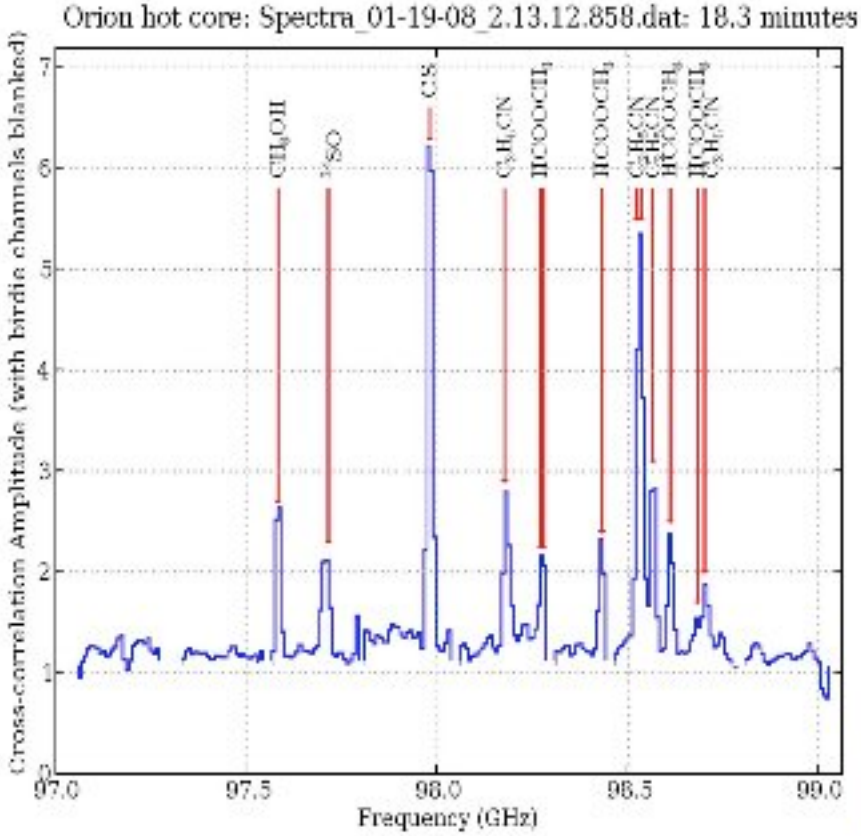
Spectrum courtesy B. Turner (NRAO)



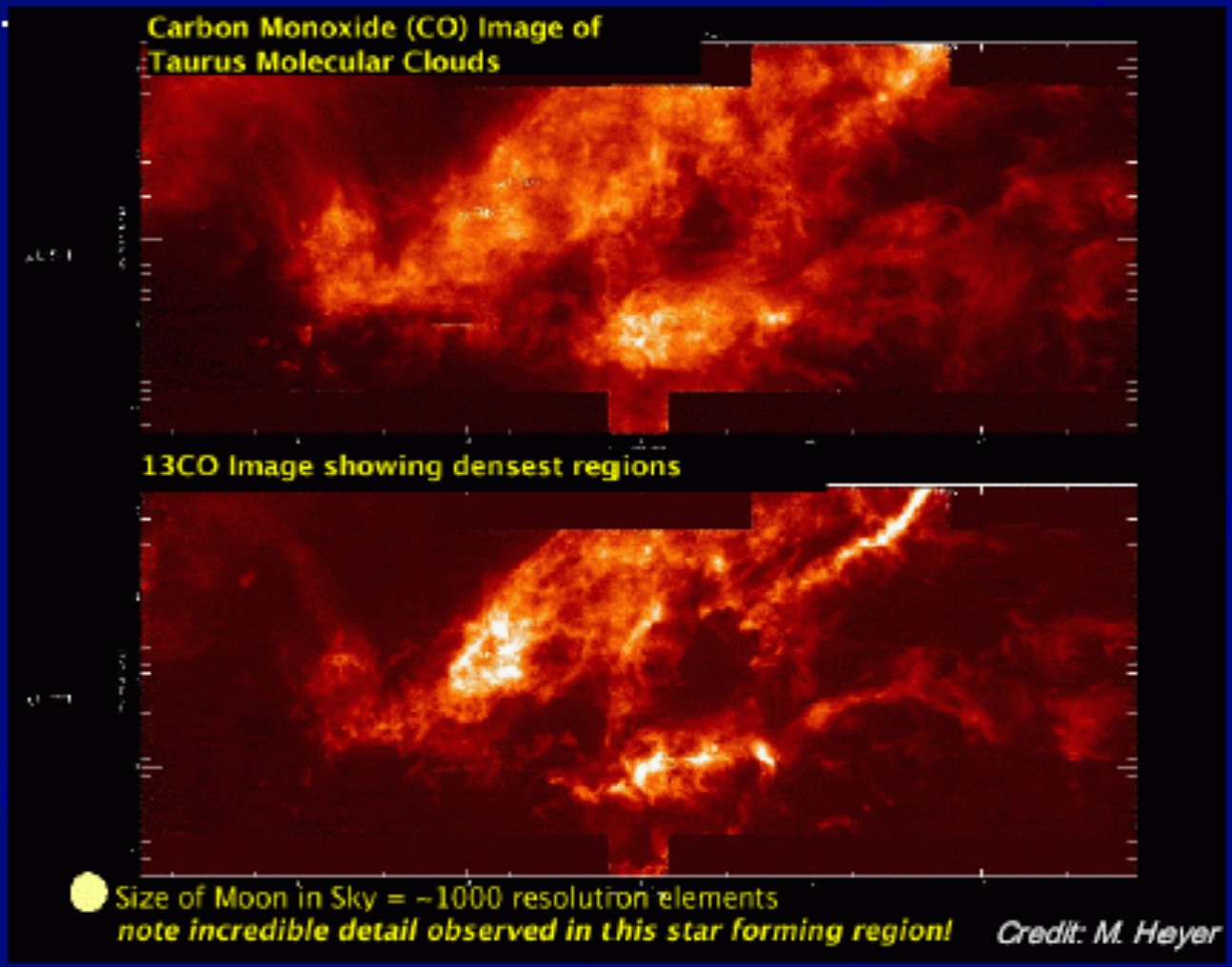
- Millimeter/submillimeter spectral components dominate the spectrum of planets, young stars, many distant galaxies.
- Most of the observed transitions of the 125 known interstellar molecules lie in the mm/submm spectral region—here some 17,000 lines are seen in a small portion of the spectrum at 2mm.

ALMA Test Facility Testing

- Defining Procedures for Commissioning
- Testing/Debugging Software
- First Fringes (Mar07), Dyn. Fringes (Nov07), Int. Spec. (Jan08), TFB spectra (Apr08), E2E capabilities demonstration (Dec09)



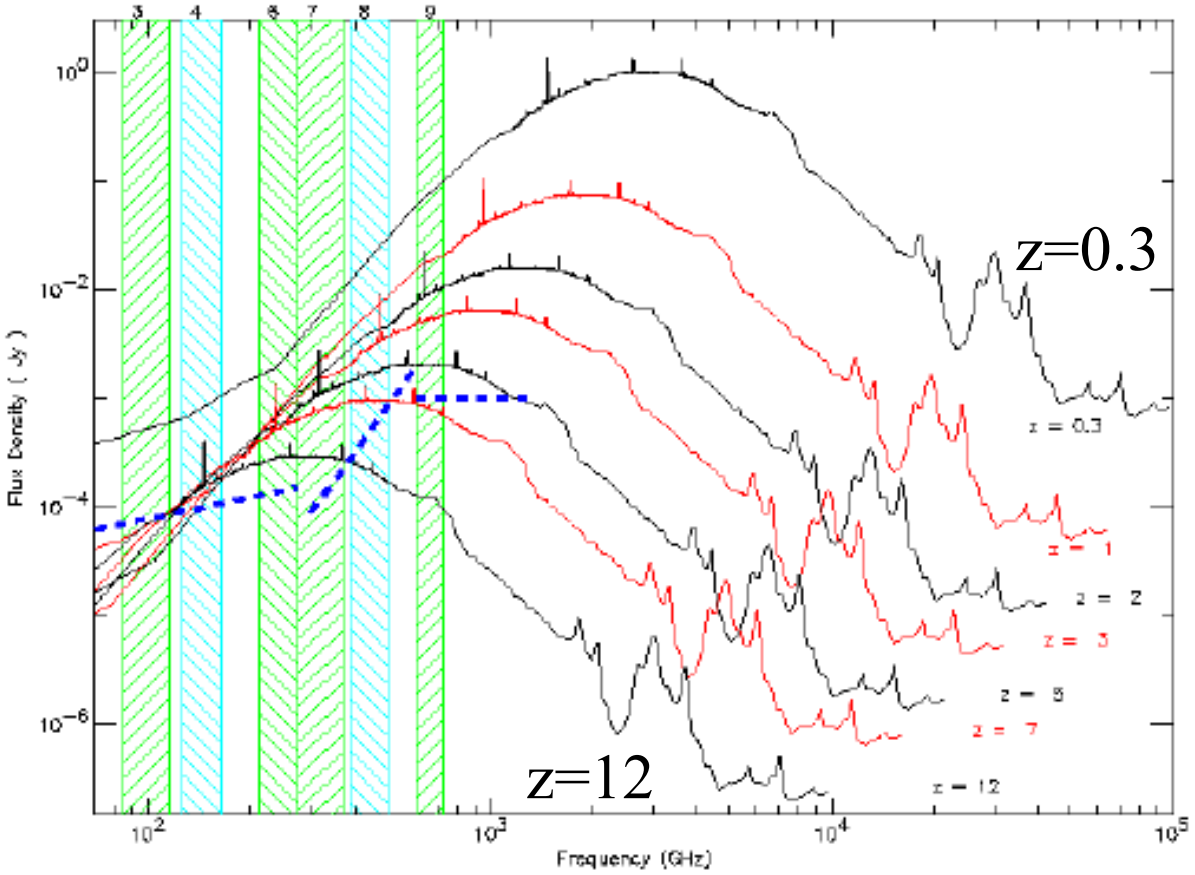
ALMA Key science 3: Interstellar Medium



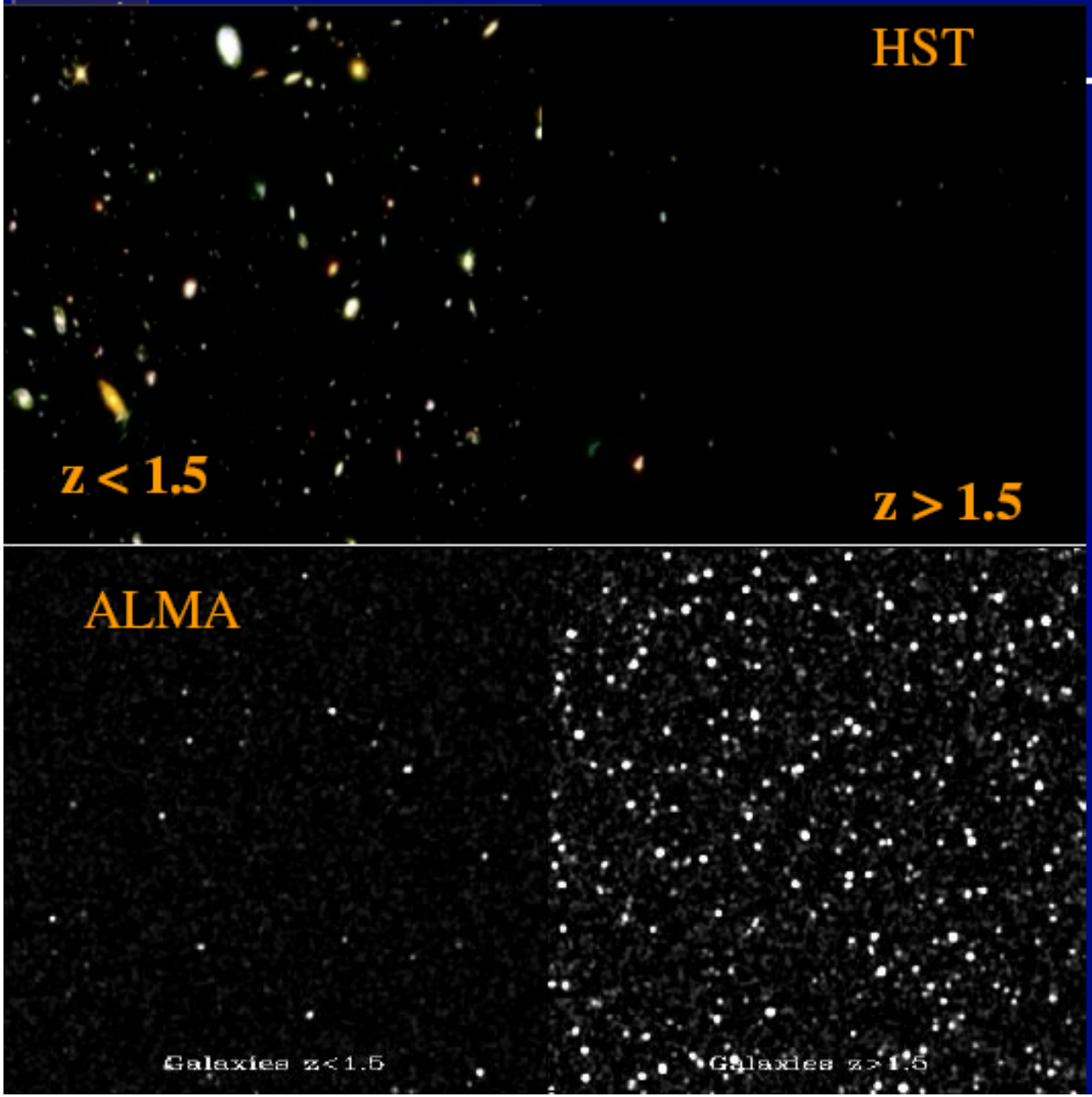
ALMA Key science 4: high redshift deep fields

M82 from ISO, Beelen and Cox

- As galaxies get redshifted into the ALMA bands, dimming due to distance is offset by the brighter part of the spectrum being redshifted in. Hence, galaxies remain at relatively similar brightness out to high distances.



ALMA Deep field: 'normal' galaxies at high z



- Detect current submm gal in seconds!
- ALMA deep survey: 3days, **0.1 mJy (5s),** 4'
- HST: a few thousand Gals, most at z<1.5
- ALMA: a few hundred Gals, most at z>1.5
- Parallel spectroscopic surveys, 100 and 200 GHz: CO/other lines in majority of sources
- Redshifts, dust, gas masses, plus high res. images of gas dynamics, star formation

ALMA OPERATIONS

- Two calls for proposals per year
- A single TAC for NA+EU+EA
- Service observing (PI not involved in observations)
- Dynamic scheduling:
  - Best project in queue determined every SB (hr-scale)
  - Depends on weather + configuration + priority

ALMA OPERATIONS

- Calibration and imaging pipeline
  - Final product: data cube

- Archive
  - Raw data + pipeline products
  - 200 TB/yr
  - public after 18 months

- User face-to-face support provided

Observing Time

- No guaranteed time
- Single TAC for NA+EU+EA
  EU ~ 35%, NA ~ 35%, EA ~ 20%, Chile = 10%
  - in ESO: D~21%, F~16%, E~9%
  - in ALMA: D~7.5%, F~5.5%, E~3%
- Huge competition to be expected
- Early Science Call for Proposals: end of 2010;
  ES starts 8 months later (2011)

Early Science Requirements

- At least 16 12-m antennas fully commissioned
- Receiver bands 3, 6, 7, and 9 available on all antennas, plus bands 4 and 8 on as many antennas as possible
- Sufficient antenna stations (platforms) to provide range of configurations covering the shortest spacings out to at least 1 km
- Synthesis mapping of single fields, plus pointed mosaic mode
- Basic set of spectral modes
- Linear and circular polarisation of compact sources
- Single-dish mapping of extended objects in both continuum and spectral line modes, including on-the-fly observing
- Calibration of all the above to a level comparable with existing mm-wave arrays - requires hot/ambient loads and WVRs
- Software to support users' applications, the preparation and execution of observations and off-line data reduction

Expected in 2012: observe >75% of time with >40% of antennas;
2013: formal end of construction

Phase 1 Observing proposal

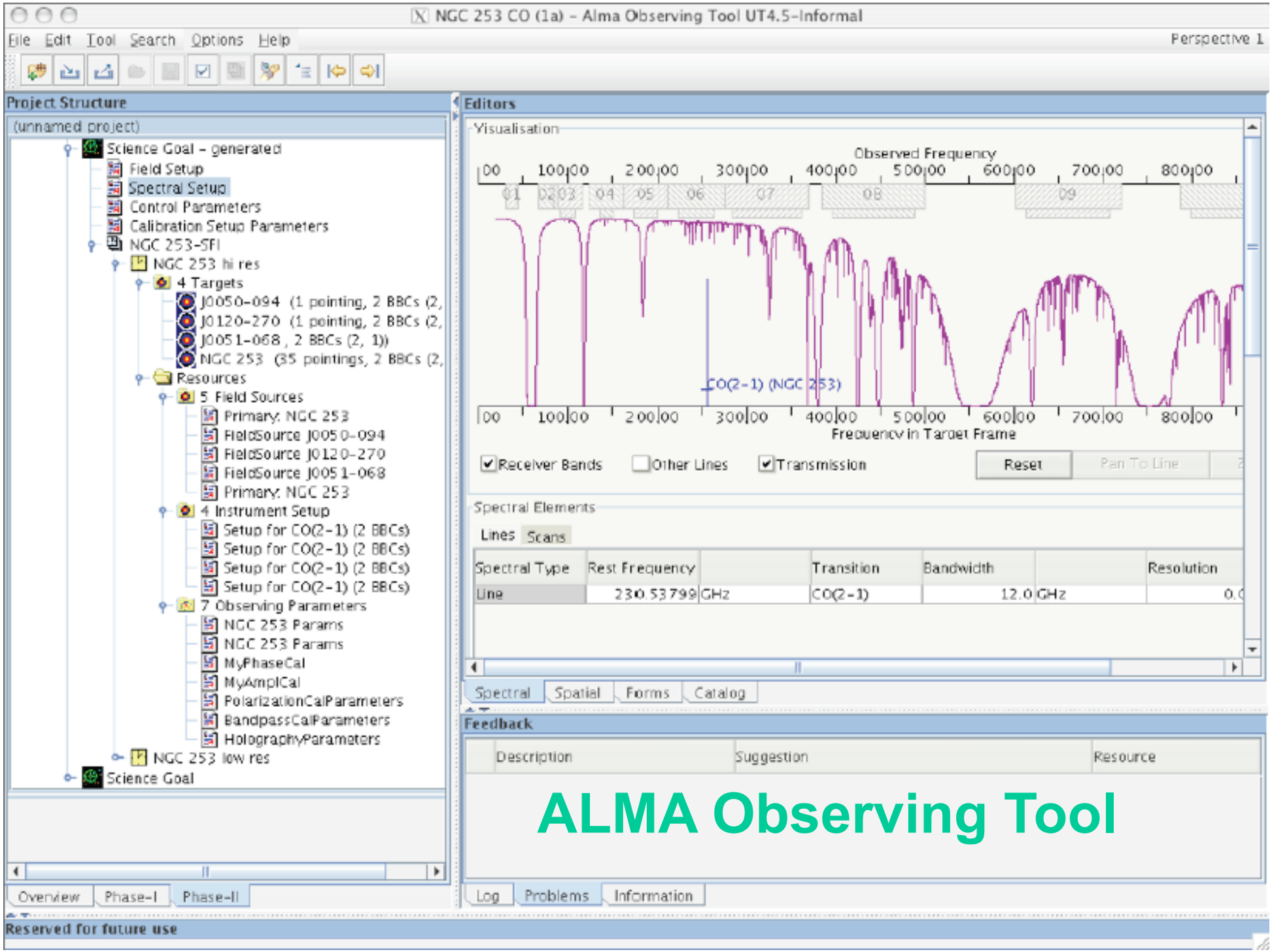
- mostly concentrated on science
- some administrative information
- minimal amount of technical information
- target list

Phase 2 Observing program

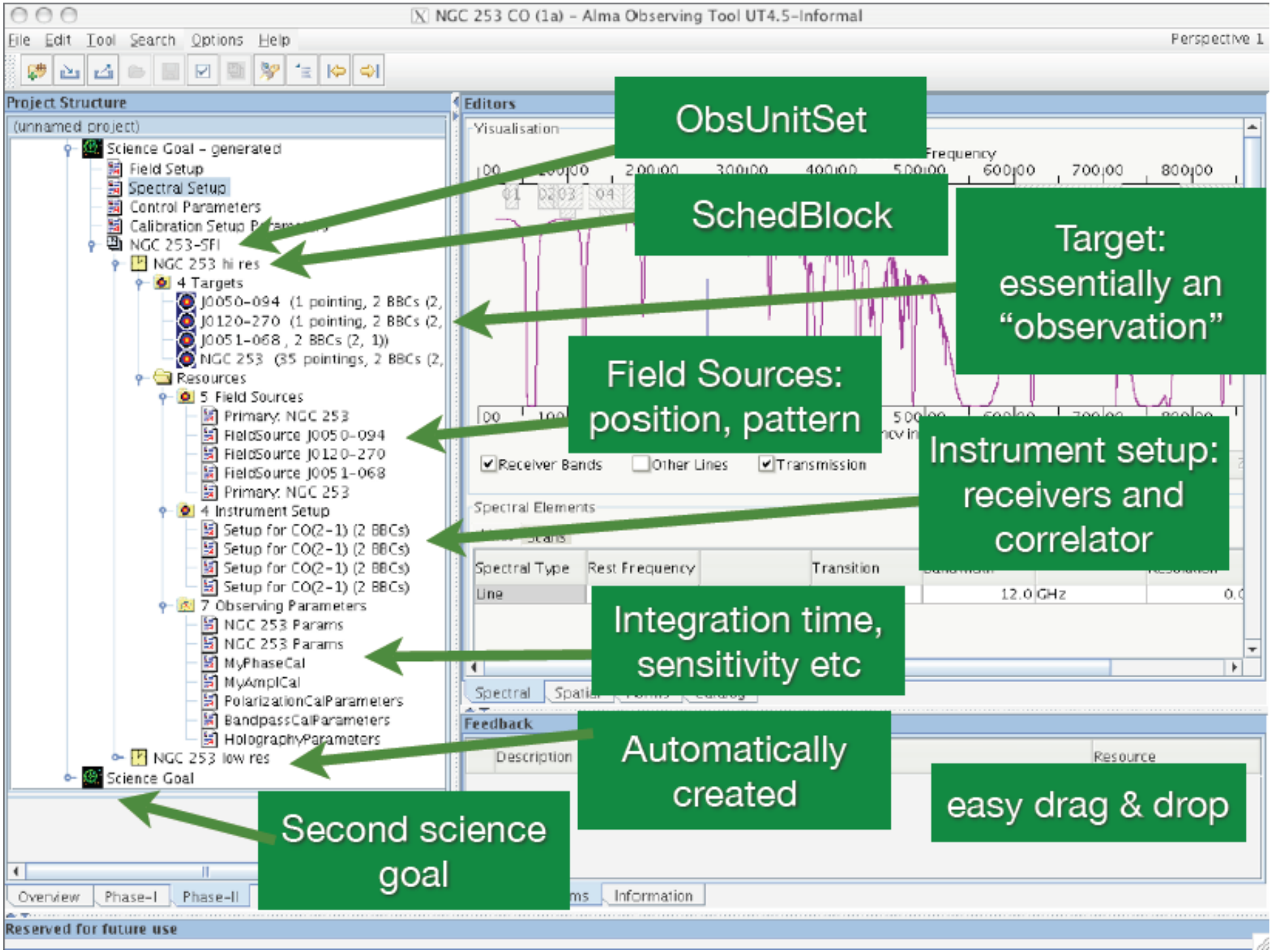
- complete set of technical details
- full specifications of how observations are to be carried out
- consistency with Phase 1

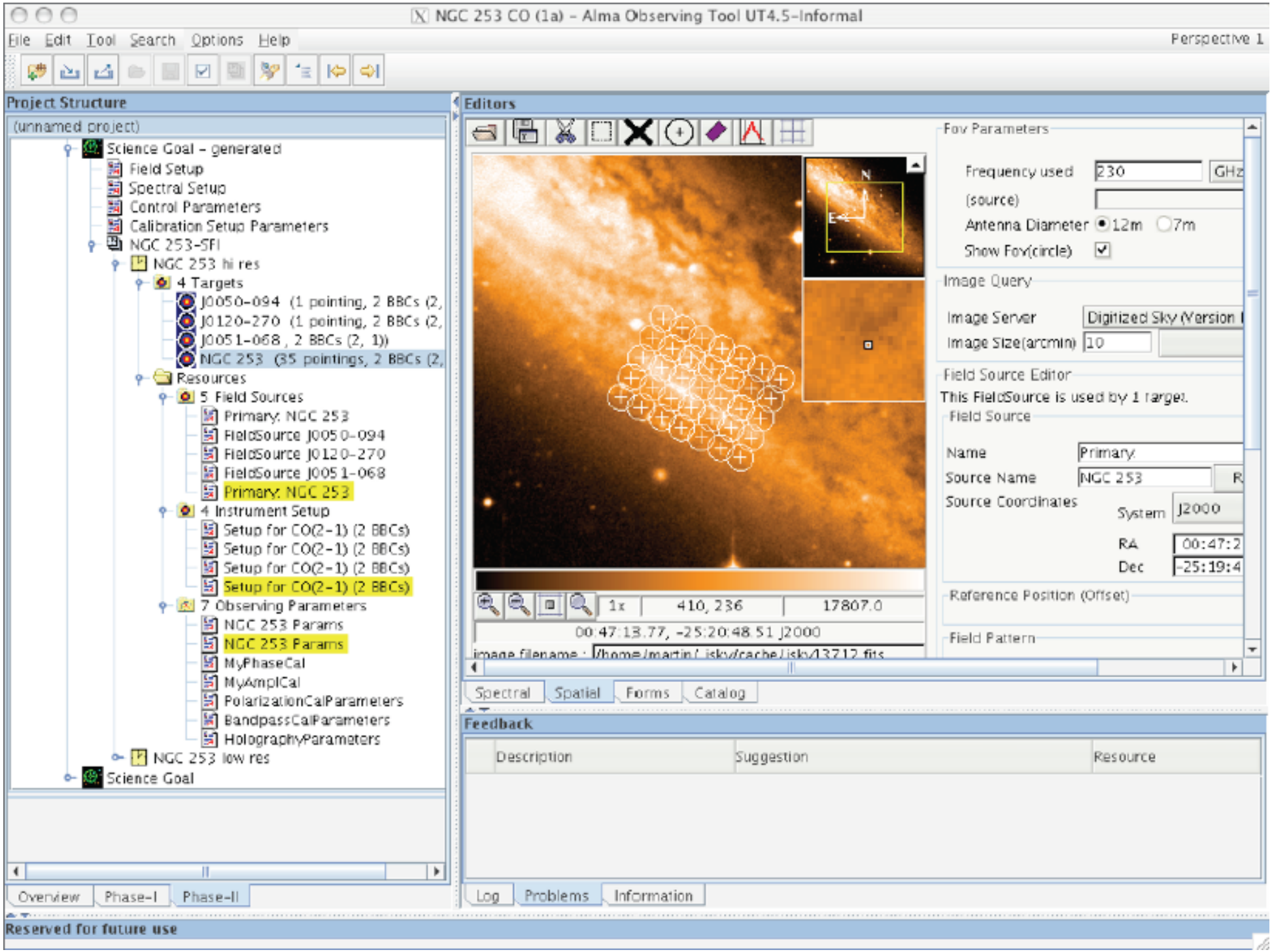
Observing program - AOT

- scheduling blocks (SchedBlocks) [cf. VLT]
  - key executable self-consistent units:
    - targets, correlator set-up, receiver set-up, pointing, phase calibrators, etc.
- Observing Units Sets (ObsUnitSets)
  - structure to support recursive hierarchy of SchedBlocks



ALMA Observing Tool


NGC 253 CO (1a) - Alma Observing Tool UT4.5-Informal
File Edit Tool Search Options Help
Perspective 1
Project Structure
(unnamed project)
Science Goal - generated
Field Setup
Spectral Setup
Control Parameters
NGC 253-SFI
NGC 253 hi res
4 Targets
J0050-094 (1 pointing, 2 BBCs (2,
J0120-270 (1 pointing, 2 BBCs (2,
J0051-068 , 2 BBCs (2, 1))
NGC 253 (35 pointings, 2 BBCs (2,
Resources
5 Field Sources
Primary: NGC 253
FieldSource J0050-094
FieldSource J0120-270
FieldSource J0051-068
Primary: NGC 253
4 Instrument Setup
Setup for CO(2-1) (2 BBCs)
Setup for CO(2-1) (2 BBCs)
Setup for CO(2-1) (2 BBCs)
Setup for CO(2-1) (2 BBCs)
7 Observing Parameters
NGC 253 Params
NGC 253 Params
MyPhaseCal
MyAmplCal
PolarizationCalParameters
BandpassCalParameters
HolographyParameters
NGC 253 low res
Science Goal
Editors
Visualisation
Frequency
Receiver Bands
Other Lines
Transmission
Spectral Elements
Spectral Type
Rest Frequency
Transition
Line
12.0 GHz
Spectral
Feedback
Description
Resource
Overview
Phase-I
Phase-II
Information
Reserved for future use
ObsUnitSet
SchedBlock
Target: essentially an "observation"
Field Sources: position, pattern
Instrument setup: receivers and correlator
Integration time, sensitivity etc
Automatically created
easy drag & drop
Second science goal


NGC 253 CO (1a) - Alma Observing Tool UT4.5-Informal
File Edit Tool Search Options Help
Perspective 1
Project Structure
(unnamed project)
Science Goal - generated
Field Setup
Spectral Setup
Control Parameters
Calibration Setup Parameters
NGC 253-SFI
NGC 253 hi res
4 Targets
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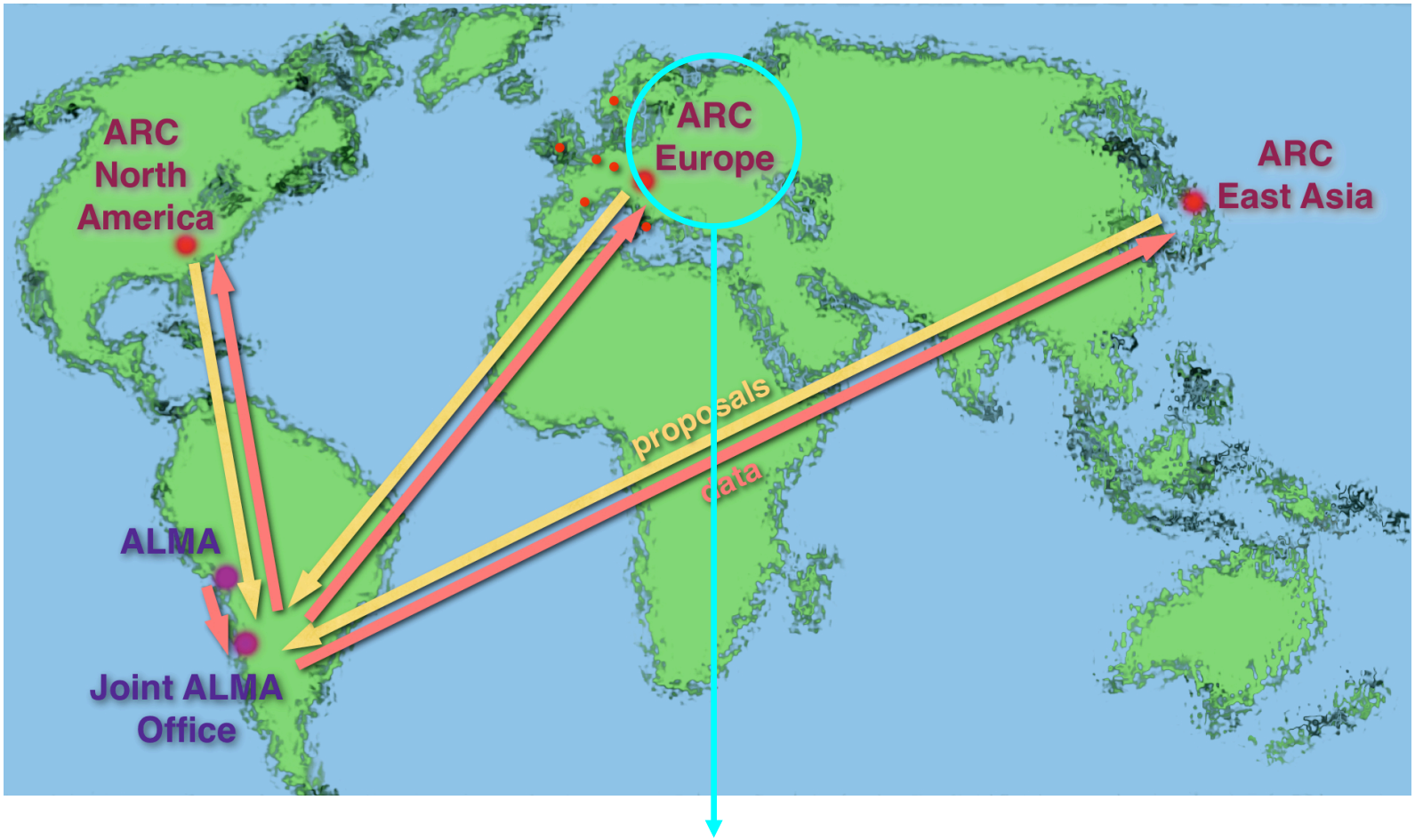
7 Observing Parameters
NGC 253 Params
NGC 253 Params
MyPhaseCal
MyAmplCal
PolarizationCalParameters
BandpassCalParameters
HolographyParameters
NGC 253 low res
Science Goal
Overview
Phase-I
Phase-II
Editors
Fov Parameters
Frequency used
230
GHz
(source)
Antenna Diameter
12m
7m
Show Fov(circle)
Image Query
Image Server
Digitized Sky (Version
Image Size(arcmin)
10
Field Source Editor
This FieldSource is used by 1 target.
Field Source
Name
Primary
Source Name
NGC 253
Source Coordinates
System
J2000
RA
00:47:2
Dec
-25:19:4
Reference Position (Offset)
Field Pattern
1x
410, 236
17807.0
00:47:13.77, -25:20:48.51 J2000
image filename :
Spectral
Spatial
Forms
Catalog
Feedback
Description
Suggestion
Resource
Log
Problems
Information
Reserved for future use

ALMA World-wide organisational structure

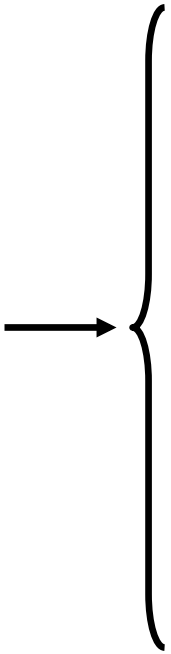


Central node (ESO) + Network of regional nodes

The EU ARC-network

ARC - EUROPE

ESO
Central node

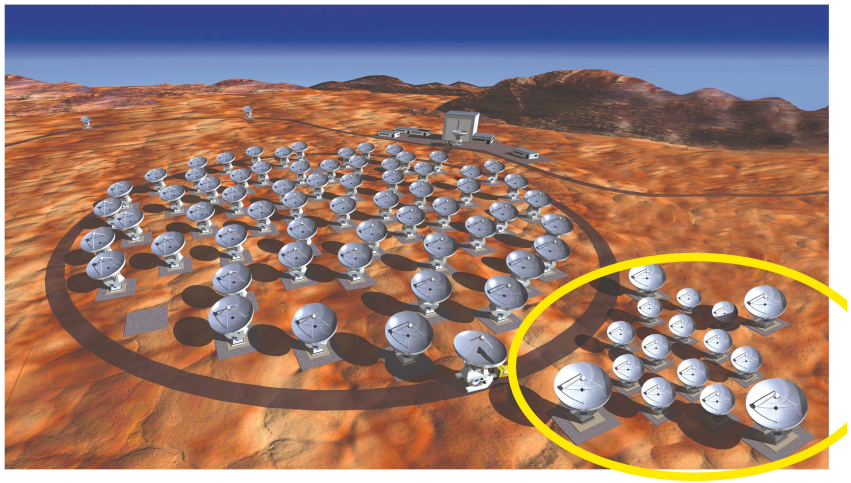


Independent regional nodes

- **Bonn-Bochum-Cologne (D)**
- **IRA, Bologna (I)**
- **IRAM (Grenoble; F, E)**
- **Leiden (+; NL)**
- **Manchester (+; UK)**
- **Nordic (Onsala; DK, S, SU + Baltic states)**

Also interested in joining: **Lisbon (P); Zürich (CH); Ondrejov (CZ); Belgium**

Responsibilities & interactions detailed in "Memo of Understanding"



50×12m + (4×12m + 12×7m)
0.3-3mm; resol: 0".015λ(mm)

ALMA

Key science
1: Planetary regions, nearby disks
2: Astrochemistry
3: Interstellar medium
4: High-redshift deep fields

Italy & ALMA

Strong interest in: planetary sciences, star formation, stellar evolution, galaxy formation, high-redshift universe, cosmology

Italian representatives in ALMA:

Testi – European Project Scientist
Tofani – ALMA Management Advisory Committee (AMAC)
Maiolino – European Science Advisory Committee (ESAC)
Andreani – EU ARC Manager
Tarenghi – former Director ALMA

Origin of the It. ALMA Regional Centre

In response to ESO-call, national INAF-ALMA Commission✹ was established in June 2004. This recommended:

IRA to host ALMA Regional Centre

Primarily based on IRA's extensive experience with (radio) interferometrical instruments, observing techniques, software packages and development, and managing large data sets.

Expression of interest from INAF to ESO.
Italian ARC: hosted by IRA-Bologna, funded by INAF

✹ Testi, de Zotti, Mack, Natta, Pucillo


Campus “Area di Ricerca”:
8 institutes (6 CNR, 2 INAF)
IRA
Mensa
Conference rooms
Central Library
CNR - Area della Ricerca di Bologna
Biblioteca di Area

European ARC

Core tasks ⇒ ESO

- Basic user support (Helpdesk)
- Emit Call for Proposals, Phase I, Phase II
- ALMA archive operations
- Data product support: delivering data and software

Additional tasks ⇒ ARC nodes

(see next slide)

ROLE of the ARC-nodes

- ✓ **Build a community (e.g. ALMA/ARC-days 2007, 2008; tutorials; seminars; schools; meetings; PRINs)**
- ✓ **Provide face-to-face user support (post-obs.) and archival data-mining**
- ✓ **Offer help in specific areas of expertise (see next slide)**
- ✓ **Provide user feedback**
- ✓ **Be involved with software development & testing manuals, cookbooks; share with the other ARCs/ARC-nodes**
  e.g. CASA-testing: Rossetti @ Socorro, ESO;
  ALMA Observation Preparation software-test
- ✓ **Be involved in commissioning/science verification phase**

http://www.alma.inaf.it/

Areas of expertise in EU ARC-nodes

1. Wide-field, high-dynamic range imaging (UK/NL/F)
2. Mosaicing (I)
3. High-frequency observing (NL)
4. Infrastructure for advances data analysis tools (D/NL/Nordic)
5. Data handling/GRID-technology (I/P)
6. Coordinating surveys/key projects (I)
7. Polarimetry (I/F/D)
8. Astrometry (Nordic/D/UK)
9. Pipeline heuristics (D)
10. Automatic data calibration (D)
11. Data pipelining (UK)
12. Multi-frequency synthesis (Nordic/UK)
13. Array combination imaging (UK)
14. Robust self-cal methods and use of WVR data (Nordic)
15. Data handling and server (P)
16. Instrumental calibration (F)
17. Atmospheric phase calibration (F)
18. ALMA imaging simulations (F)

Present situation

ARC-working group consisting of:

6 staff-members Brand, Gregorini, Mack, Nanni, Prandoni, Zanichelli

2 post-docs + 1 technician:

Rossetti (VLBI, radio, polarisation, extra-galactic)	60%
Mignano (software development, opt/IR, extra-galactic)	50%
Bedosti (computer systems, software)	100%

<7/2008: Fontani ((sub-) mm, galactic; preparation for ALMA)

Rossetti: One of 4 EU CASA-user support specialists who train EU community in its use, and act as interface between the EU-users and developers at NRAO.

Future situation

Immediate Future:

1 new post-docs to be hired 2009/10 (deadline 21 Oct. 2009)
1 ESO-ALMA COFUND Fellow arrives 2010 (deadline 1 Nov.)
INAF: ARC astronomer (tenure) 2010
INAF: ALMA science (tenure) 2010 (Arcetri or IRA)
Hardware acquisition: ≥ 2008 (www.alma.inaf.it)

Long-term: ≥ 2011:

1 FTE provided by (4-6) IRA-staff; 1 system manager;
4 post-doc positions

+ Involve experts from other institutes

Activities: recent & future

Regular (ca. 1/month) internal ARC-meetings

Received first visitor!

CASA-tutorial - May 2010

ALMA-course (Rome/Teramo) - Nov. 2009

International School on “ALMA and Astrochemistry”
(COST Action: The Chemical Cosmos: understanding chemistry in astronomical environments) - 2010/11

Preparation of visitors’ open-plan offices

Web page development (Joomla!) (http://www.alma.inaf.it)


Italian ARC
http://www.alma.inaf.it/
Google
Google Maps
YouTube
Wikipedia
News (300)
Popular
firefox
Italian ALMA Regional Centre
ALMA-related activities of the Italian astronomical community
INAF
ISTITUTO NAZIONALE
DI ASTROFISICA
NATIONAL INSTITUTE
FOR ASTROPHYSICS
ALMA
You are on page: Home
Main Menu
Home
About us
Local Staff
Local Resources
The News
ALMA News
Reports & Documents
Meetings
Alma Nodes
ALMA Info
NRAO: Alma
ESO: Alma
German ARC
Dutch ARC
U.K. ARC
Nordic ARC
IRAM ARC
Management
Administrator
Systems Monitor
The Italian ARC is one of the six nodes that constitute the European network that will provide technical and scientific support to ALMA users.
The nodes will be operating in close collaboration with each other and with the central node at ESO, Garching. Each node contributes its own specific expertise, in order to ensure that maximum advantage is taken of the European competences in the field of mm-astronomy and interferometry.
Once ALMA is fully operational, the Italian ARC intends to fullfill its duties regarding face-to-face help and computing support.
International Post-Doctoral Fellowship (05/2009/IRA/BS)
A postdoctoral position will be available at the Italian node of the European network of ALMA Regional Centres (ARCs). When ALMA is operational, the ARC-nodes will provide general user support and infrastructure for data analysis.
Last Updated on Sunday, 20 September 2009 11:49
Read
ESO
prog
2009
http://www.alma.inaf.it/
For detail see : ESO Fellowship
There is the possibility for applicants to
Search
Search
search...
Who's Online
We have 1 guest online
Jobs @ INAF-Arc
test
test
Jobs @ ESO
2009/9999 Speculative Application
2009/0051 Operation Staff Astronomer
2009/0050 Telescope Instruments Operator
2009/0048 System Engineer
2009/0047 ARC Astronomer

Italian ALMA Regional Centre

ALMA-related activities of the Italian astronomical community

INAF
ISTITUTO NAZIONALE DI ASTROFISICA
NATIONAL INSTITUTE FOR ASTROPHYSICS

Main Menu

- Home
- About us
- Local Staff
- Local Resources
- The News
- ALMA News
- Reports & Documents
- Meetings

Alma Nodes

- ALMA Info
- NRAO: Alma
- ESO: Alma
- German ARC
- Dutch ARC
- U.K. ARC
- Nordic ARC
- IRAM ARC

Local resources

At the host institute we are presently equipping an open-plan office to simultaneously accommodate at least four visitors requesting face-to-face help

The ARC will furthermore provide visitors with a dedicated computer server and adequate disk space. Each visitor's workspace will be equipped with a desktop computer, with which he can connect to the server (running CASA) and access the data.

The host institute, and therefore the ARC, will be connected with a high-speed optical fiber network to the outside world, allowing fast data transfer (1 Gbit/sec in 2009; 10 Gbit/sec by 2012).

The ARC has already acquired part of the hardware we think necessary for an efficient service, and will extend computing power and storage capacity over the next two – three years to its full potential. Presently we have 16 Tb of diskspace and one 12-unit blade cluster (96 cores) dedicated to the ARC.

- The ARC Open Space (0 Articles)
- The ARC cluster of computers (4 Articles)
- Software (4 Articles)

The News
ALMA News
Reports & Documents
Meetings

Alma Nodes

- ALMA Info
- NRAO: Alma
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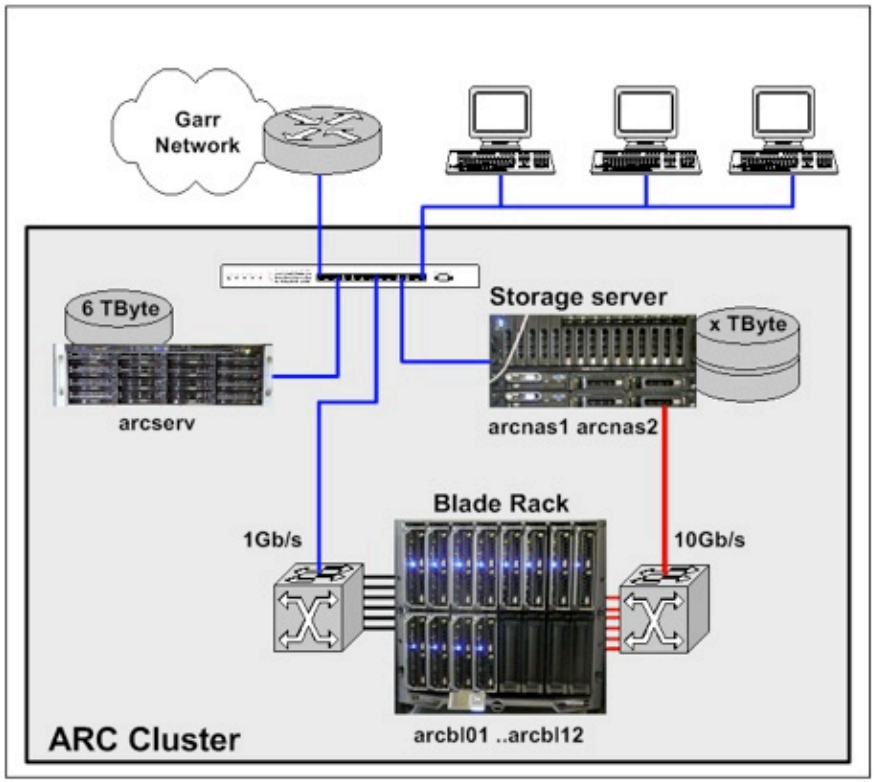
- Dutch ARC
- U.K. ARC
- Nordic ARC
- IRAM ARC

The cluster is built up on two high-speed neworks; one at 1 Gbit/sec for standard TCP/IP comunication and the second one at 10 G bit/sec for the network file system. The computing core of the cluster is the blade rack DELL PowerEdge M1000E that holds 12 "blade computers" **arcbl01** .... **arcbl12.**



The computing elements (**arcbl01** .. **arcbl12**) and the storage servers (**arcnas1** and **arcnas2**) use a local private network and cannot be used starting from outside the Bologna Campus. The server **arcserv** is the gateway to access the ARCcluster from the pubblic internet at the address **arcserv.alma.inaf.it**. Arcserv host can be accessed via ssh and moreover hosts all the nework services (accounting, web, ftp, etc) of the Italian ARC.

Many Terabyte of disk space will be required for data reduction during the operational stage. The server **arcnas1** and **arcnas2** manage, in a redundant way, the Raid 5 system that holds the disks packs and works as disk server for the GPFS network file system. All the cluster nodes will mount the data space via GPFS filesystem on the 10 Gbit/sec network. Also the systems outside the cluster will mount the network file system, but only via NFS at 1Gbit/s.

At the Alma operation stage the link with the Garr network, that is the Italian National Research & Educational Network, will have a speed from 1 to 10 Gbit/s.

Characteristics of the computer in the ARC cluster

Importance of having an Italian ARC

- Italy gains expertise in mm-interferometry, which is going to be very important in the next decade(s).

- It gives Italian community advantaged entrance to ALMA and to the EU-ALMA network (ESO, other regional nodes); Italian users can tap into the network of expertises; Access to Commissioning, easier access to Early Science.

- Development of GRID technology, expertise in transmission and archiving of large quantity of data is in synergy with other applications (e.g., e-VLBI, mm-VLBI, Lofar).

- Participation in EU funding network through FP7 RadioNet, ITN, COFUND.

USEFUL WEB PAGES

Latest News:
http://www.almaobservatory.org/

General ALMA pages at ESO:
http://www.eso.org/sci/facilities/alma/

Possible Science Projects (DRSP):
http://www.eso.org/sci/facilities/alma/science/drsp/

ESO-ARC pages:
http://www.eso.org/sci/facilities/alma/arc/

Italian ARC-pages:
http://www.alma.inaf.it/

Check for job offers.