ALMA Overview and Status

ALMA Community Days 2013

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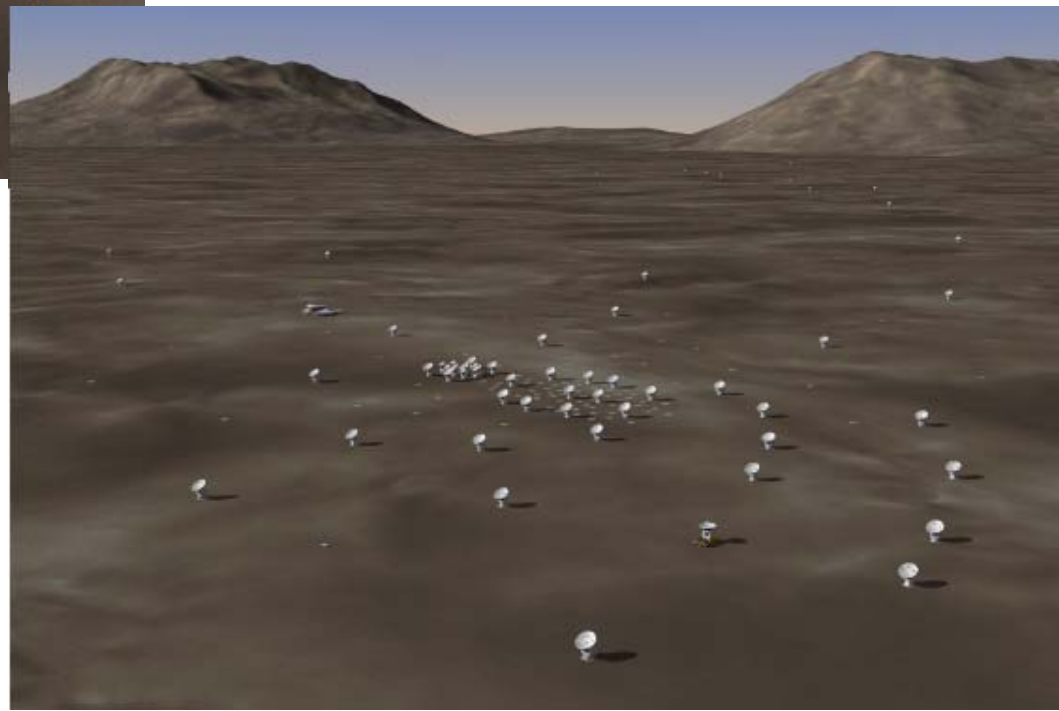
ALMA Overview

- Aperture synthesis array for (sub)mm wavelengths of 10 mm – 0.3 mm (35 – 950 GHz)
- High, dry site, Chajnantor Plateau, Chile (5000m)
- 66 antennas (54 x 12m + 12 x 7m)
- Baselines from ~15 m to 16 km
- Resolution/arcsec ≈ 0.2(λ/mm)/(max baseline/km)
  - 5 mas for highest frequency/longest baseline
- Field of view / arcsec ≈ 17 (λ/mm) [12m dish]
- Sensitive, wide-band (8 GHz) receivers; full pol.
- Flexible digital correlator giving wide range of spectral resolutions.

ALMA Configurations

Most compact configuration
(max 150m): 0.5” … 5”



In the future:
most extended configuration
(max 16km): 0.005” … 0.05”

OSF – Operations Support Facility

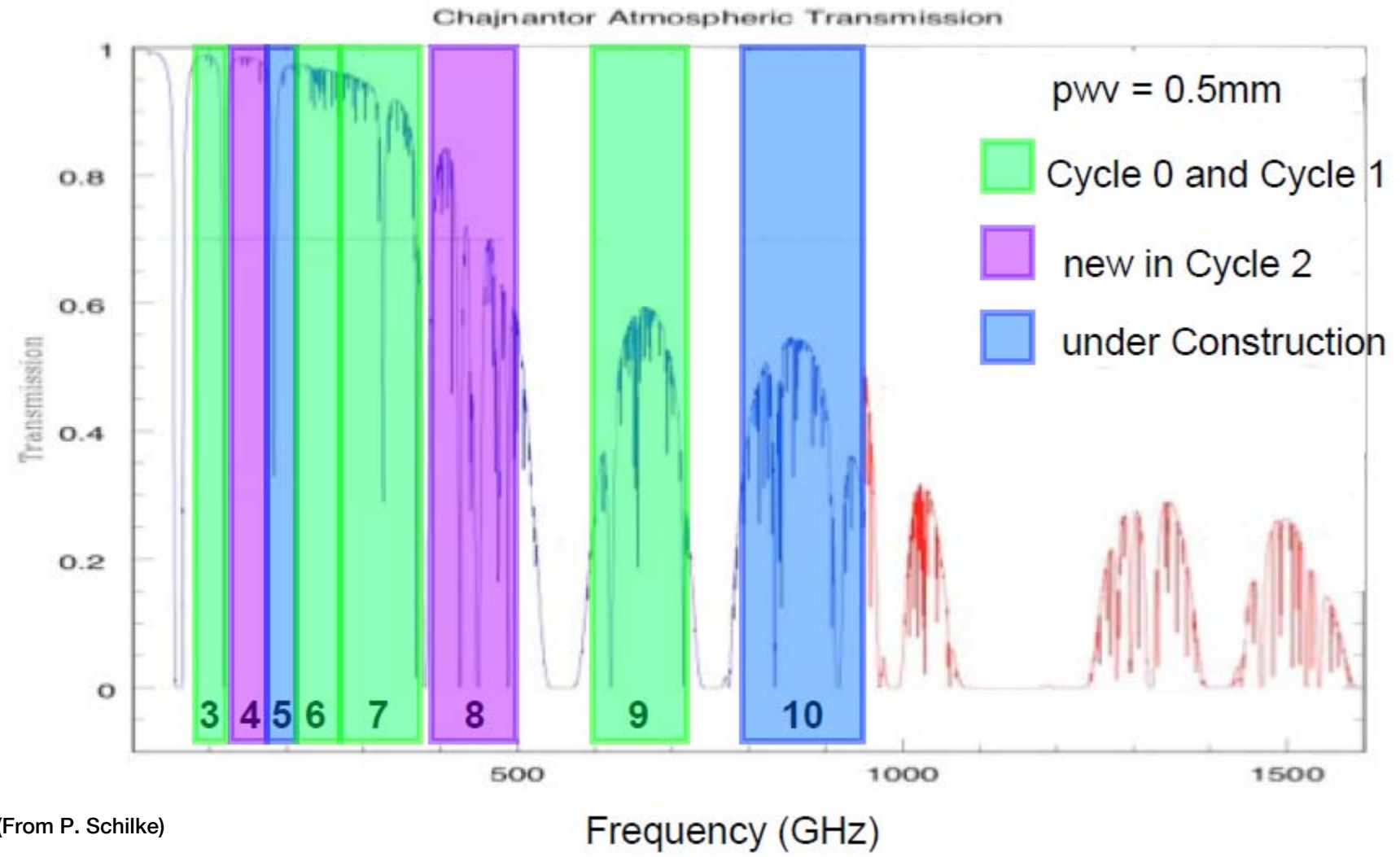
- Altitude 2900 m
- ALMA control room
- Technical labs
- Dormitories & canteen

Receiver Bands

ALMA Band	Frequency Range (GHz)	Receiver Noise (K) over 80% of the RF band	Temperature (K) at any RF Frequency	produced by	Receiver Technology
1	31 - 45	17	26	tbd	HEMT
2	67 - 90	30	47	tbd	HEMT
3	84 - 116	37	60	HIA	SIS
4	125 - 163	51	82	NAOJ	SIS
5*	162 - 211	65	105	NOVA/OSO	SIS
6	211 - 275	83	136	NRAO	SIS
7	275 - 373	147	219	IRAM	SIS
8	385 - 500	196	292	NAOJ	SIS
9	602 - 720	175	261	NOVA	SIS
10	787 - 950	230	344	NAOJ	SIS

* Full Band 5 production from 2013 - 2017

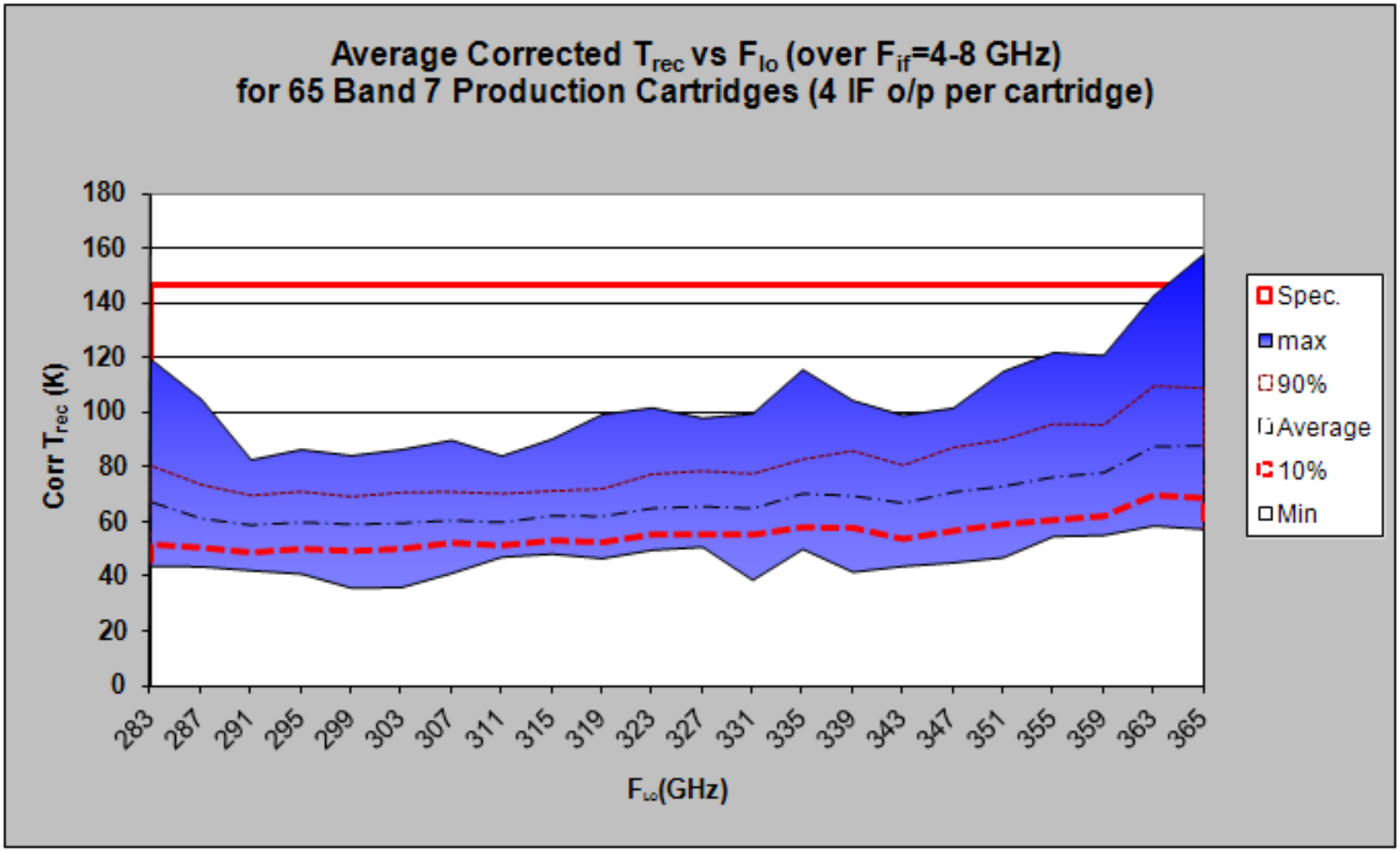
ALMA Bands & Atmosphere



(From P. Schilke)

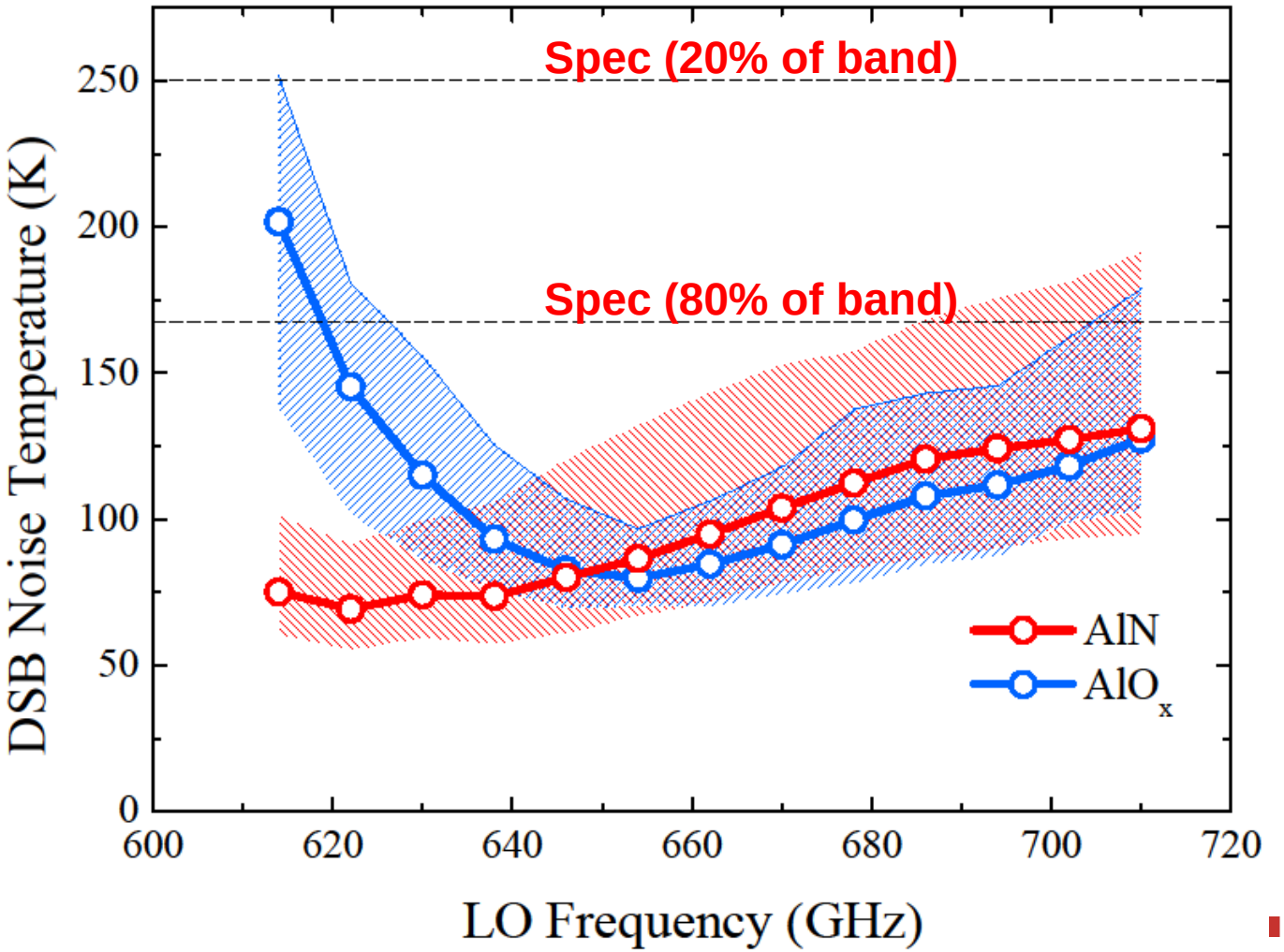
Band 7 Performance

- Sensitivity ~2 times better than specification



Band 9 Performance

- Sensitivity up to 2 times better than specification



Construction Status

- Construction planned to be finished by end 2013
  - Some activities extending into 2014/15
- Antennas: all 66 delivered, last on 23 Sep
- 60 array elements at 5000m site (48x12m, 12x7m)
- All have Bands 3, 6, 7, and 9
  - Bands 4, (5), 8, 10 arriving
- Both correlators complete
- Front End and Back End items almost complete
- Remaining pads becoming available by end 2013
- Inauguration 13 March 2013

Last AEM antenna on 23 Sep

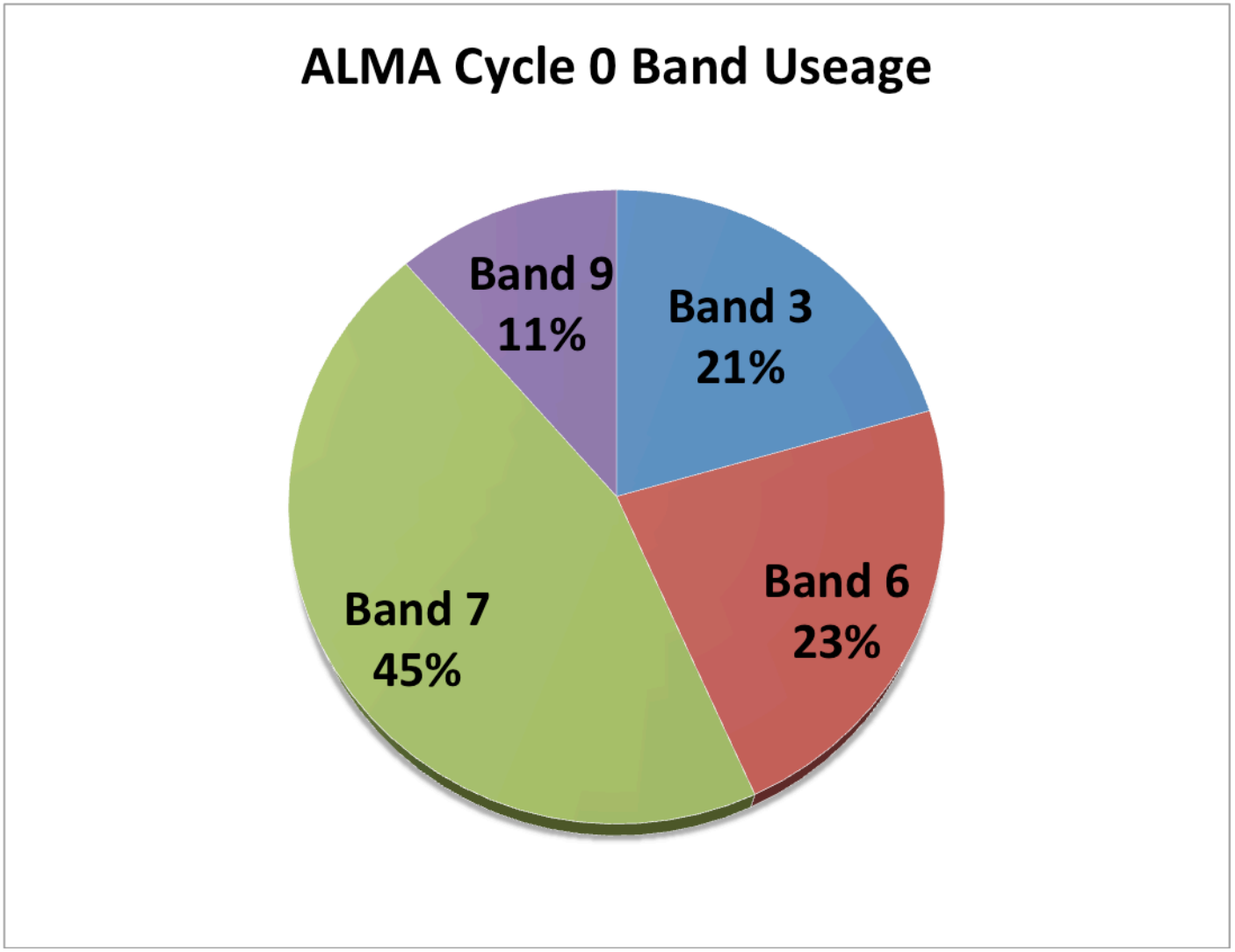
This is a major milestone for ESO and the ALMA project.

Many thanks to the Antenna IPT, Science IPT and the contractors for this achievement !

ALMA Early Science

- Cycle 0 ended 2 Jan 2013. Almost all high-priority projects have been delivered to PI's, at least in part
- Cycle 1 start was delayed by bad weather, power cuts and local staff strike
- Both cycles heavily oversubscribed (10:1)

ALMA Bands Useage

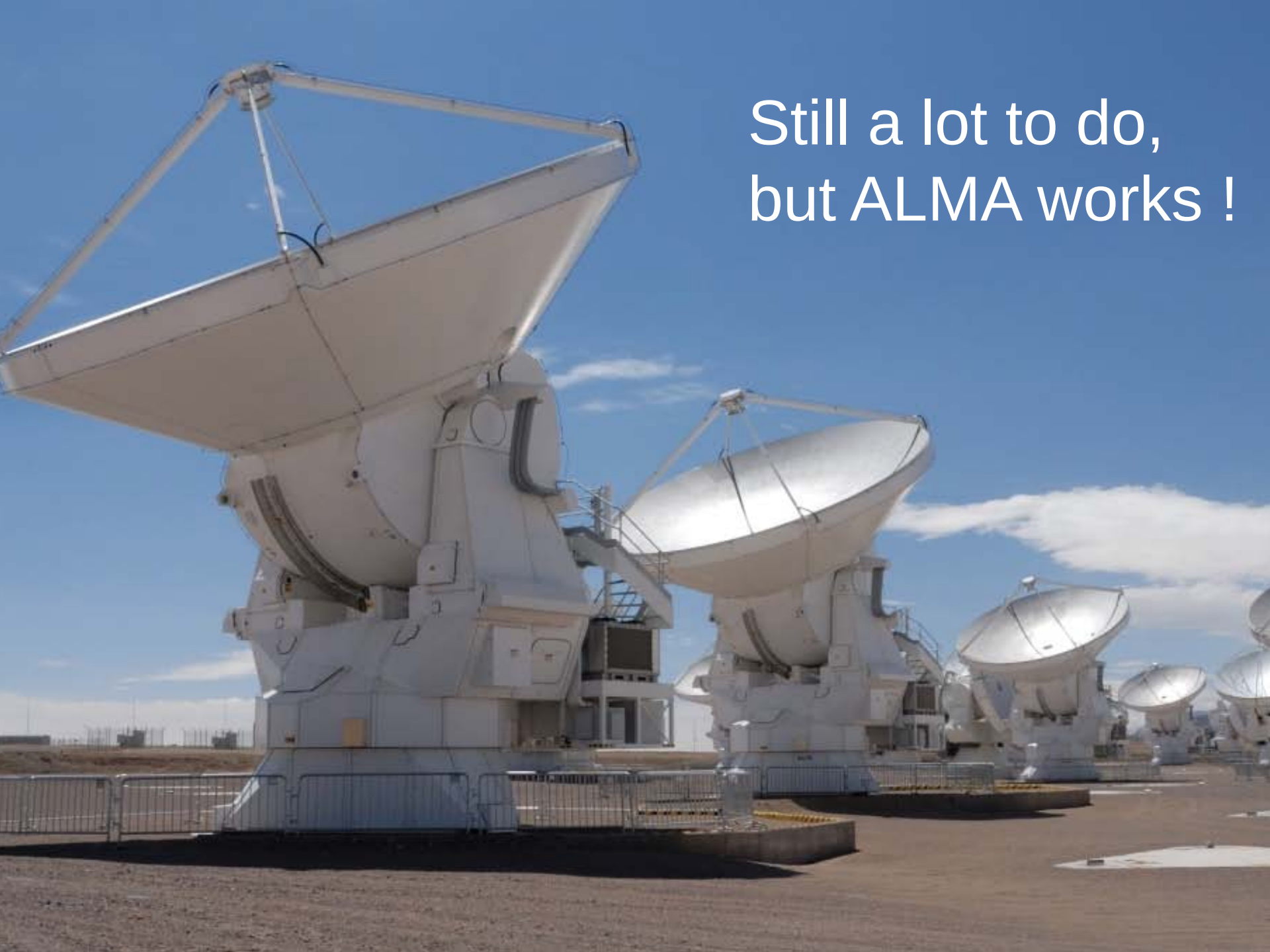


ALMA Development Studies

- Underlying concepts at ESO
  - Work with institutes in ESO Member States
  - Develop a strategy based on science priorities from the user community
- EU Development Plan Studies
  - First round 2010-2013: complete or well under way
  - New call issued in June 2013, proposals are evaluated
- Studies in the other regions and coordination
  - Yearly study cycles in NA since 2012
  - Different selection process in EA
  - Coordination via Project Scientists and workshops

Ongoing Development Projects

- Band 5 (167-211GHz) full production (EU-led)
  - NOVA/Chalmers/NRAO (2013-2017)
  - Following FP6 funding for six receivers
- Fibre connection OSF – Santiago (JAO-led)
- ALMA phasing project/VLBI (NA-led)
  - Mostly funded by NSF outside the ALMA Development Programme + in-kind contributions
  - MIT Haystack/NRAO/MPIfR/OSO/NAOJ/ASIAA/...
- Band 1 (EA-led)
  - Approved to build prototype


Still a lot to do,
but ALMA works !