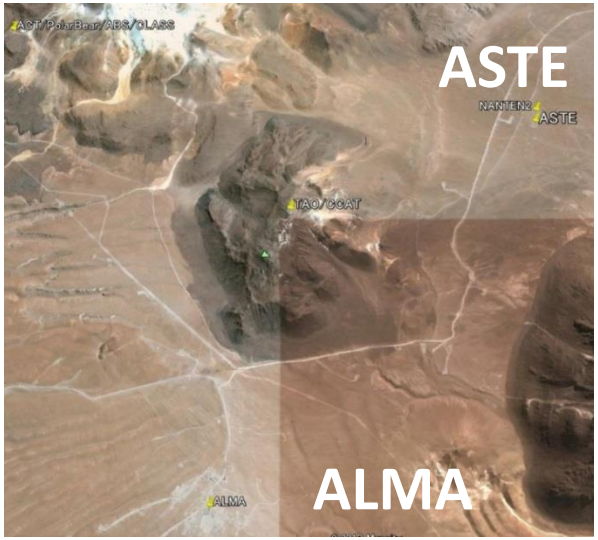
ASTE Status Reort

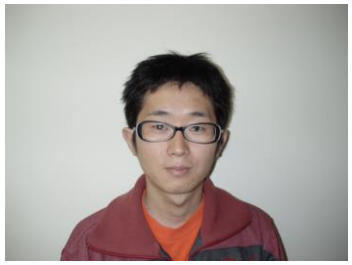
Shin’ichiro Asayama and ASTE team

Atacama Submillimeter Telescope Experiment (ASTE)

- 10-m sub-mm telescope located at Pampla La Bola within Chajnantor area
- **Specifications of telescope:**
  - Surface accuracy: 19um
  - Pointing accuracy: 2” rms
  - Scientific Observing Time: 2,200h/year
- **Infrastructure:**
  - Diesel generators x 2 (max 150kw – 220V)
  - Fuel tanks (15,000 L x 2, consumption 300L/d)
  - Satellite Network (1Mbps)
  - Weather Station, web cameras, etc
- **The prime objectives of ASTE operations:**
  - to strength the proposals for the ALMA
  - to provide advanced science capabilities for the East Asian astronomers

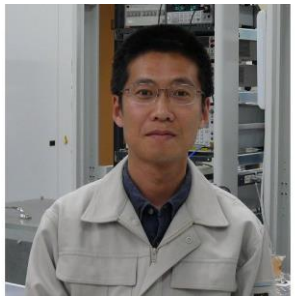


ASTE Organization



Takeshi Okuda
(JAO Sr Instrument Engineer
from April,2016)

Shin'ichiro Asayama



Masumi Yamada

Daisuke Iono

Yasunori Fujii

The University of Chile,
and many Japanese Universities:
The University of Tokyo,
Hokkaido University,
Nagoya University,
Keio University,
Osaka Prefecture University,
Ibaraki University,
The University of Electro-Communications, and
Joetsu University of Education.

Science Operation Policy

- NAOJ Chile Observatory TAC: 90%
  - Detailed operation plan discussed at JSAC.
  - 2 semesters of call for proposals provided East Asian community (JP, TW, KR) from 2014.
  - Guaranteed Time Observation (GTO)

    The ASTE consortium contributes to developments of instrumentation on ASTE, commissioning and science verification, and science operations. In return for doing these contributions, members of the ASTE consortium can apply for GTO.
  - Open Use Observations & GTO proposals are evaluated by same referees.
  - Observers remotely conduct their observations from Mitaka, SPdA facility, and their institutes (for experts).
- Chilean Time (CT) evaluated by CNTAC: 10%

Summary of Science Operation between 2013 and 2015

Season	2013(a)	2014(a+b)	2015(a+b+c)
Open Use: submitted	39 (800h)	53 (1427h)	51 (1809h)
Open Use: accepted	13 (252h)	32 (879h)	39 (1202h)
Open Use: Oversubscription	3.0 (3.2)	1.7 (1.6)	1.3 (1.5)
Open Use: allocated time[A]	292 hours	1470 hours	1643 hours
GTO: submitted	6 (212h)	6 (176h)	1 (50h)
GTO: accepted	6 (169h)	6 (176h)	1 (50h)
GTO: allocated time[B]	142 hours	324 hours	81 hours
Chilean Time[C]	3 (61h)	1 (50h)	6 (122h)
Observation time (A+B+C)	495 hours	1844 hours	1846 hours

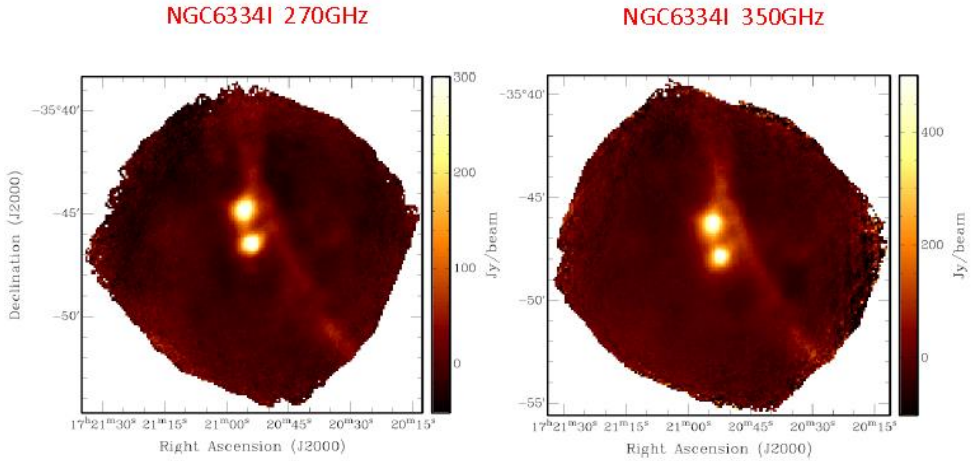
ASTE Instrumentation

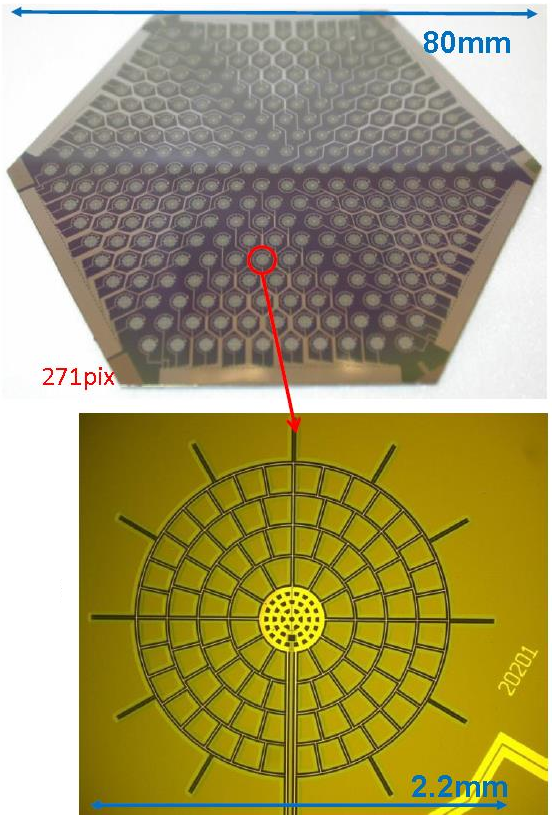
Receiver	Type	Freq. [GHz]	HPBW [arcsec]	Npix	Npol	Status
CATS345	Heterodyne	324-372	22	1	1	Decommission in 2014
DASH345	Heterodyne	324-372	22	1	2	Open from 2015
Band8	Heterodyne	385-500	17	1	2	Open from 2015
ASTECAM	TES Bolometer	270	28	169	-	Commissioning from March 2016
		350	22	271	-	

Spectrometer	Type	Quantization	Bandwidth [MHz]	Nchan	Δf [MHz]	Status
MAC	XF	2-bit	512	1024	0.5	Open
			128		0.125	
WHSF	FX	3-bit	4096	4096*	1.0	Open from 2014b
			2048		0.5	

ASTE operation Plan in 2016

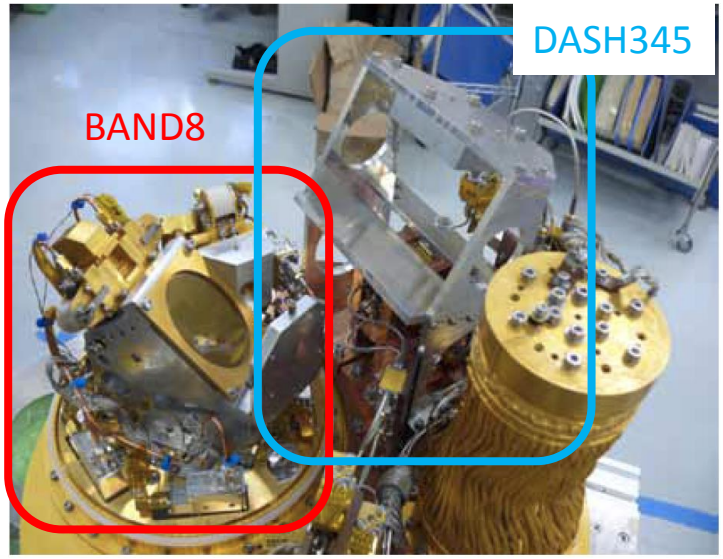
- Science operation
  - **ASTECAM CSV (Mar – Jul)**
    - CSV plan reviewed by JSAC.



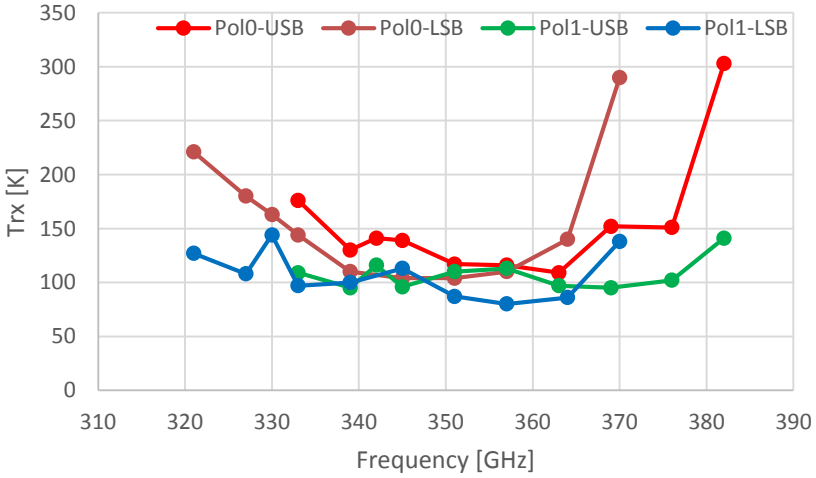


  - **Open use observations with DASH345/BAND8 (Sep - Dec)**
    - Total time: *720 hours* for open use

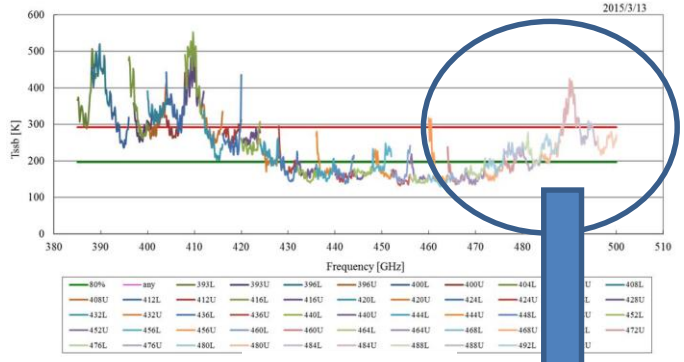
DASH345/ ASTE BAND8



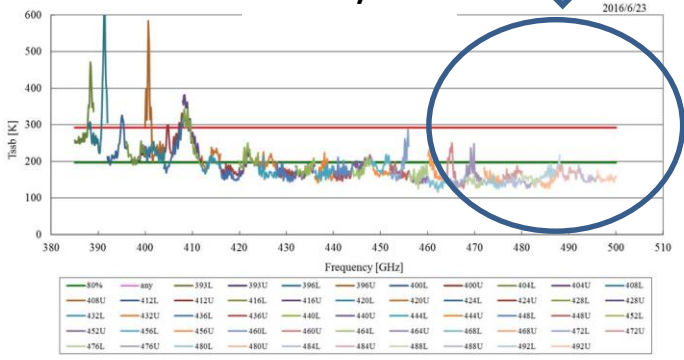
- DASH345
  - 1-pix 345GHz-band RX (2-pol/2SB)
    - Tsys (DASH345) < Tsys(CATS345)
- ASTE BAND8
  - Fixed and upgraded BAND8 QM
  - Operated by ALMA FEMC (NRAO)



Last year



This year

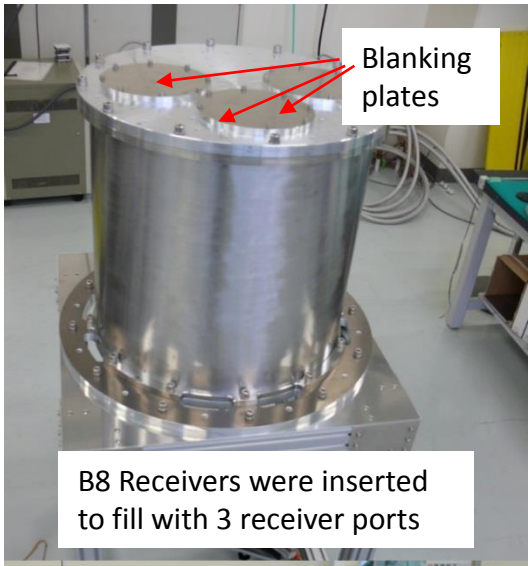


Medium-term Operation Plan

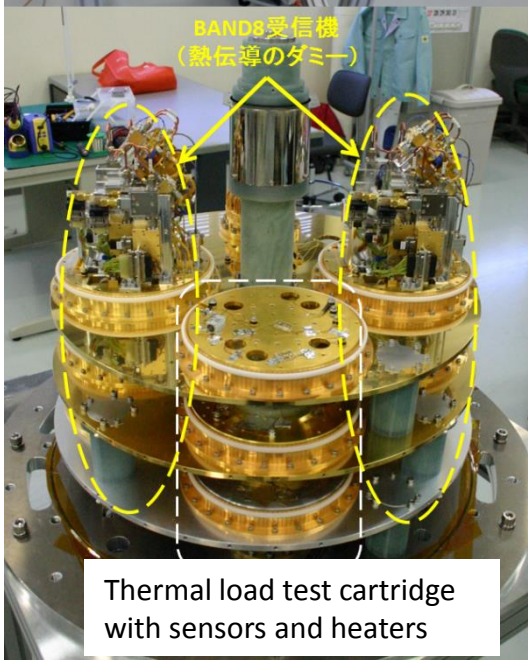
- Steady-state science operations with *ASTE future instruments*
- To maximize observing time for EA and Chilean community.
- To enhance synergy with ALMA and other telescopes including NRO 45m.

Spectroscopic Observations

- New 3-cartridge cryostat
  - Operate 3 cartridge-type receivers simultaneously.
  - Developed by NAOJ ATC
  - Operated on ASTE from 2017
- Cartridge-type receivers
  - New 345GHz-band (modified DASH345)
  - ASTE BAND8
  - 0.9/1.3THz-RX **(**The University of Tokyo**)**
  - 230GHz-RX (The University of Electro-Communications)
  - 1-beam/4-beam BAND7+8 developed by KASI
- GPU Spectrometer developed by KASI



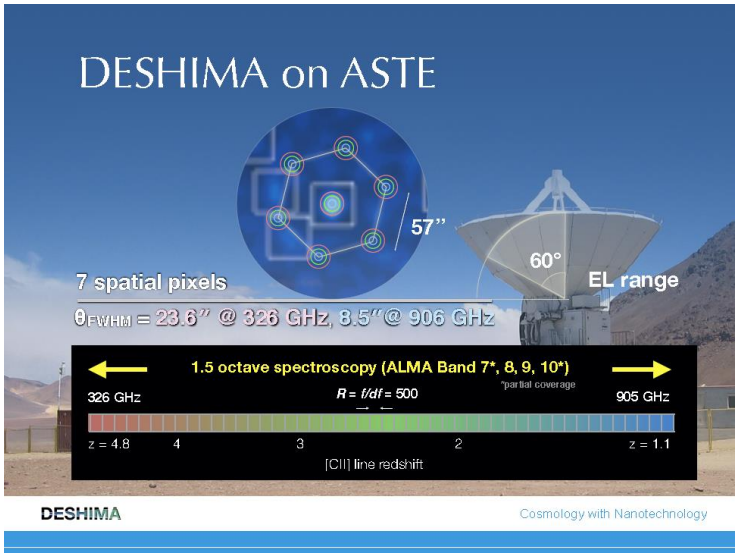
B8 Receivers were inserted to fill with 3 receiver ports

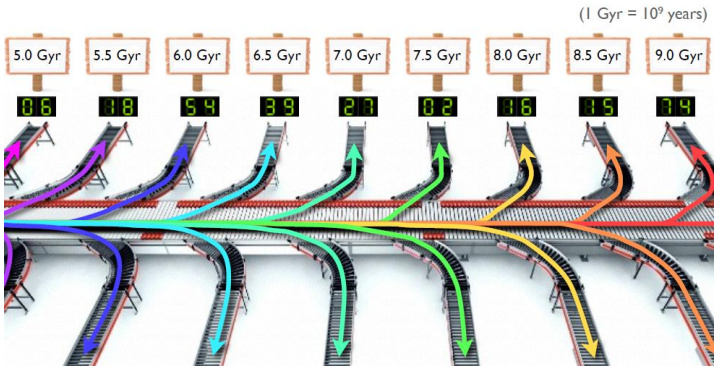


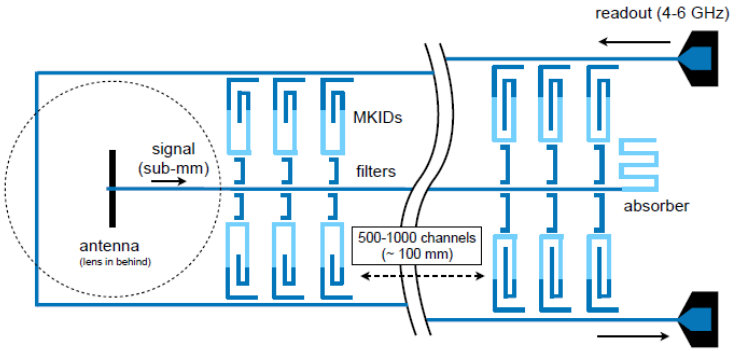
Thermal load test cartridge with sensors and heaters

Continuum Observations

- ASTECAM will be offered for open use in 2018.
  - 270 GHz-band & 350 GHz-band will be available
  - To be subjected to reviews and be decided for open use
- Polarimeter on ASTECAM (*A-Pol*)
- DESHIMA
  - On-chip imaging spectrograph based on superconducting resonators
  - developed by TU Delft
  - operated with ASTECAM
  - 326-905 GHz w/ R=500
  - Mapping Submm Universe







ASTE Future Plan

- Development and Upgrades
  - To connect ALMA future developments with a long term vision.

ASTE	ALMA
0.9/1.3 THz receiver	BAND11
Multi-beam receiver (4-beam BAND7+8)	Multi-beam receiver for TP array
GPU Spectrometer	Spectrometer for TP array

  - To supplement ALMA
    - ASTECAM, Polarimeter on ASTECAM
    - DESHIMA

Operation schedule 2016-19

	Mar	Apr.	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
2016	ASTECAM(270GHz/350GHz)					DASH345						
						BAND8						
2017			New 345GHz-RX					DESHIMA				
			BAND8									
2018	*ASTECAM(270GHz/350GHz) +DESHIMA/A-Pol											
2019	*4-beam BAND7+8 (Science Operations)											
	345 GHz-RX (backup)											
2020	(TBD)											

Year	Open Use	Commissioning
2016	DASH345/BAND8	ASTECAM
2017	345GHz/BAND8	BAND7+8
2018	*ASTECAM	Full-DESHIMA/A-Pol
2019	*4-beam BAN7+8/345GHz	TBD

*To be subjected to reviews and be decided for open use

ASTE Call For Proposals 2017

- **Available observing mode:**

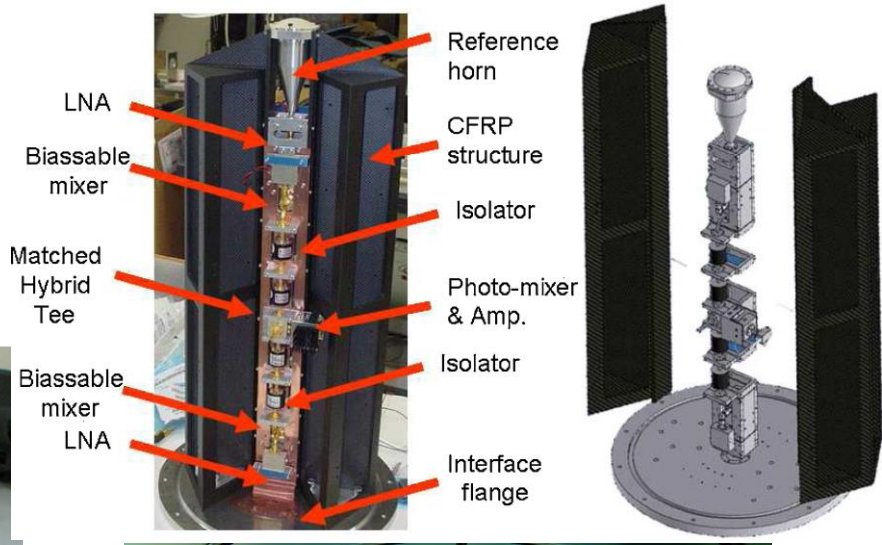
  Single-beam spectroscopy observations in 350GHz-band (DASH345) and ASTE Band 8 with both the spectrometers (MAC/WHSF) are offered for open-use proposals.

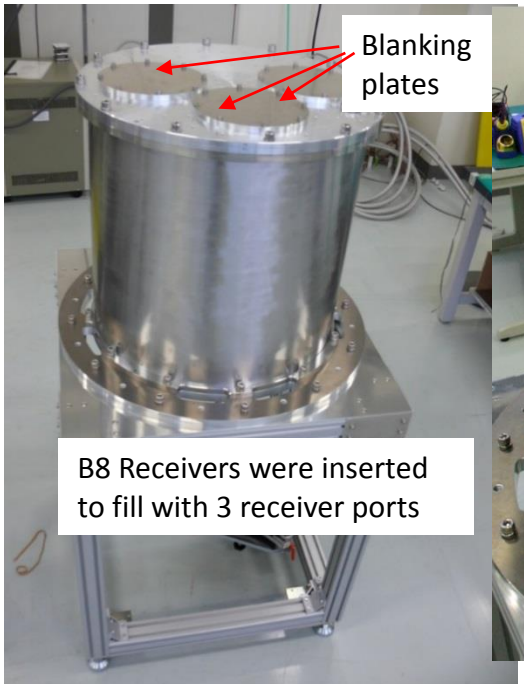
- **Scheduling period:** June 1st to September 30th, 2017
- **Total observing time:** 1000 hours between 0-6h and 11-24h in LST
- **Submission deadline:** **December 13, 2016 (15:00 JST or 6:00 UT)**

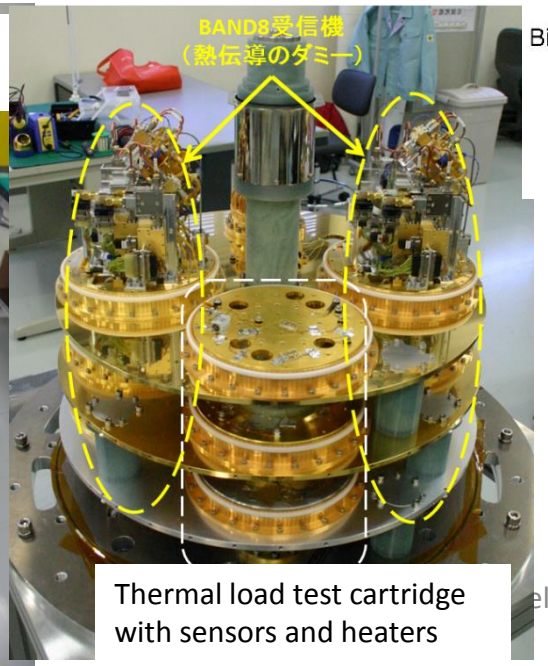
NAOJ – Chile collaboration

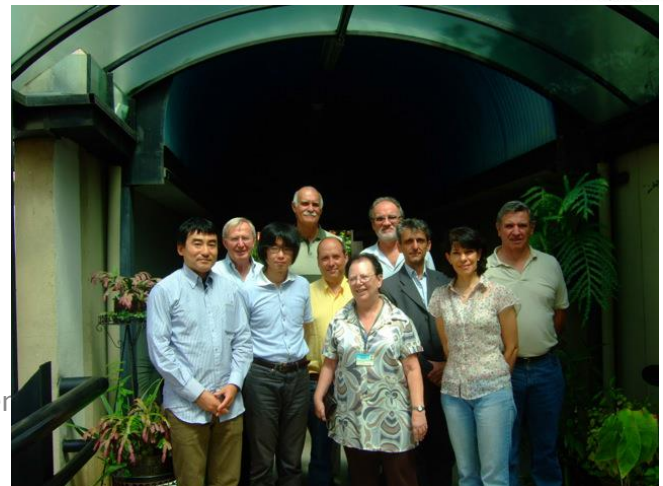
NAOJ – Chile collaboration

- ALMA Band 1, Bamd 2+3 optics
  (Valeria Tapia et al.)
- LLAMA Holo Rx (Rodrigo Reeves, Universidad de Concepción)
- LLAMA three cartridge cryostat









Summary

- The NAOJ Chile Observatory has steadily established the steady-state science operations of ASTE with the current capabilities and is planning the operations to maximize observing time and to save the resources.
- The medium-term operation plan with ASTE future instruments has been developed.
- ASTE Call for Proposal deadline: **December 13, 2016 (15:00 JST or 6:00 UT)**
- **Hope Future collaboration with you!**