

The Status of ALMA and the Activities of EA ALMA Regional Center

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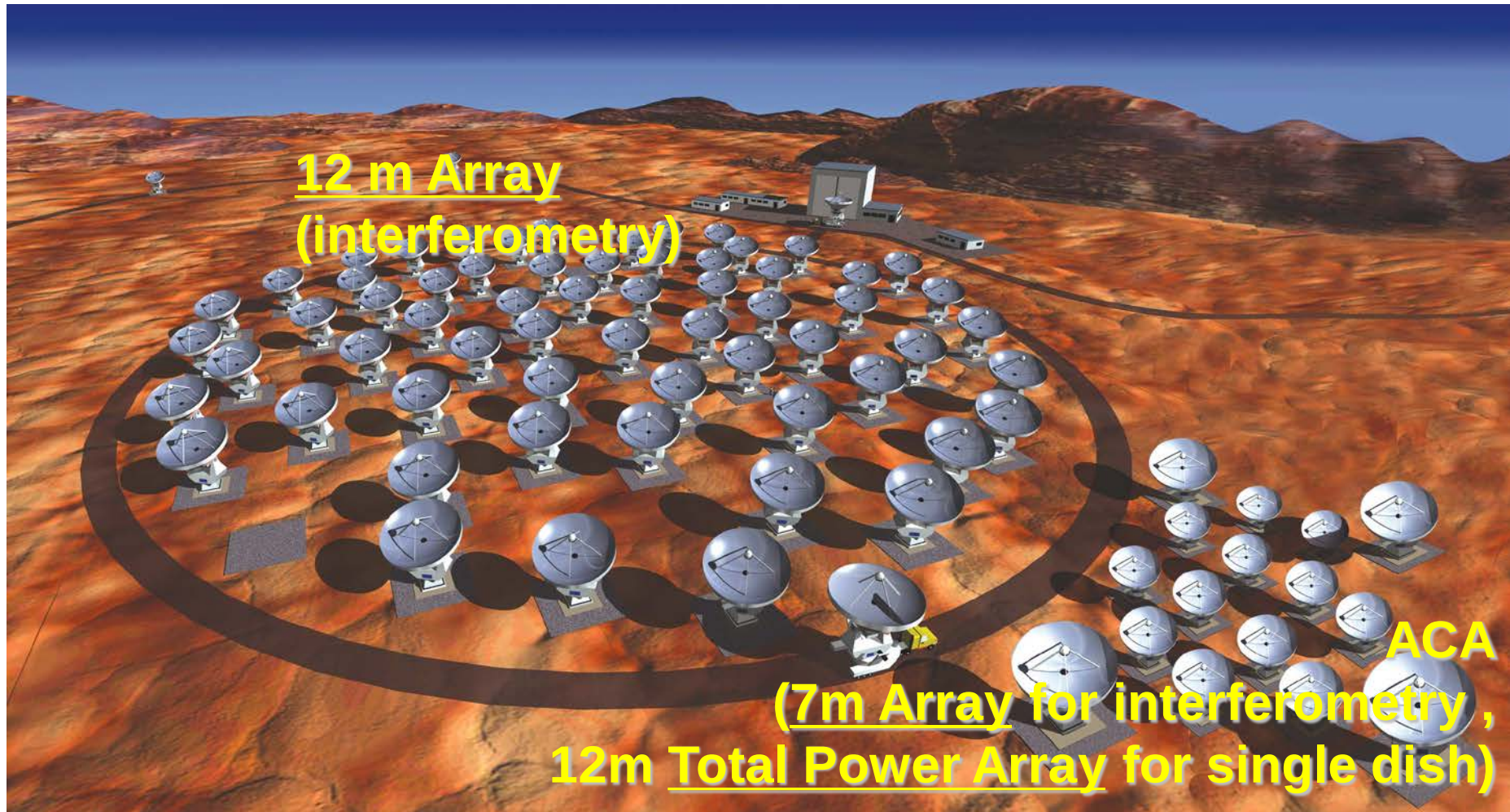


ALMA

- International project to build & operate a large (66 antennas) millimeter/submm ($\lambda \sim 0.4\text{-}3\text{mm}$) array at high altitude site (5000m) in northern Chile.
- Project began in 2002; Japan joined in 2004; early science from 2011; inauguration and 66th antenna delivery in 2013
- Two orders-of-magnitude improvement in mm radio astronomy capabilities.



ALMA + ACA (a.k.a. Morita Array) → Atacama Large Millimeter/submillimeter Array





Final ACA Antenna Delivered with the new name "Morita Array" 2013





Cycle 1 (2013 Jan-2014 May) Status

- Originally planned to end in 2013 Oct, but rescheduled to end in 2014 May, mainly due to a re-prioritization of the commissioning activities
- In addition, we suffered from adverse weather conditions, power issues, a worker's strike.
- We are resuming to normal operation in October
- However, only 56% of Cycle 1 Highest Priority project will be completed by the end of Cycle 1.
- We offer “Cycle 1 Transfer” eligible to Cycle 2 if projects are not completed within Cycle 1, if PI agree to make the proposal metadata (abstracts, positions, frequency, angular resolution, sensitivity) public



Slow delivery in Cycle 0

Table 3: Median data delivery timescales.

Data Processing & Delivery timescales	Median (days)
Days between last SB execution and SB posted for assignment	7
Days between "available for assignment" and QA2	45.5
Days between QA2 and Delivery	11
Total time (days)	84

- EA ARC Science Support 8 staff → 13 staff
- New Comers (7): Shinya KOMUGI, Hiroko SHINNAGA, Bunyo HATSUKADE, Rie MIURA*, James CHIBUEZE*, Cinthya HERRERA*, Yiping AO* *=postdoc
 - Two moved to JAO: Espada, Kurono



Status of Cycle 1 projects

Table 1: Status of Cycle 1 projects as of October 1, 2013 (not considering ACA)

Priority=Highest, 12-m Array only	Projects	SBs	Executions
Total Number	197	481	810
Started (passed QA0)	27	33	66
Passed QA2 or delivered (partly or completely)	5	7	18
Completed	3	4	9

Table 2: Data Processing Timescales

Median Data Processing & Delivery times (days)	Cycle 0 (344 SBs)	Cycle 1 (7 SBs)
Days since available for assignment and QA2	45	16
Days since QA2 and Delivery	12	2
Total time (days)	68.5	17

Cycle2 Timeline

- Call for proposals :Oct 24, 2013
 - Deadline :**Dec 5, 2013**
 - Start of observations :Jun 1, 2014
 - End of observations :Oct 31, 2015
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- From Cycle 2, South Korea will become ALMA partner country



Knowledge Transfer Meeting for Koean Colleagues

- 2013 August 5-9, Mitaka
- A-Ran Lyo, Miju Kang, and Minho Choi attended
- Phase II Generation, CASA data reduction and QA2 (quality assurance), Pipeline, Helpdesk
- Important milestone for Korean participation!



Town Meetings by EA ARC

- Visit to 12 Japanese Universities/Institute
 - Tohoku, Ehime, ISAS, Kagoshima, Tokyo ICRR+IPMU, Kyoto, Nagoya, Hiroshima, NAOJ Hawaii, Tsukuba, Osaka Prefecture, Hokkaido Univ
- Two final Town Meetings in **Mitaka** (same material, for people's convenience)
- Support for Town Meeting at **KASI** (Oct 28)
- 3-4 ARC staff for university/institute visit
- ALMA general info, Radio Astronomy basics, Observing Tool tutorial, CASA simulator demo, Q&A

Overview

Cycle 1

Cycle 2

Antenna

32 x 12m

34 x 12m

9 x 7m

9 x 7m

2 x TP

2 x TP

Configuration

1 km max

1.5 km max (B3,4,6,7)

1.0 km max (B8,9)

Rx

Band 3,6,7,9

Band 3,4,6,7,8,9

Time available

800 hours

~ 2000 hours

Polarization

Not available

12m array,
B3,6,7 only
Single field (1/3 of PB)
Fixed freq (continuum only)

12m array configuration

Band	Frequency [GHz]	Wavelength [mm]	Max spatial res. [arcsec]
3	84 - 116	2.6 – 3.6	0.41
4	125 - 163	1.8 – 2.4	0.27
6	211 – 275	1.1 – 2.4	0.18
7	275 – 373	0.8 – 1.1	0.12
8	385 – 500	0.6 – 0.8	0.12
9	602 – 720	0.4 – 0.5	0.09

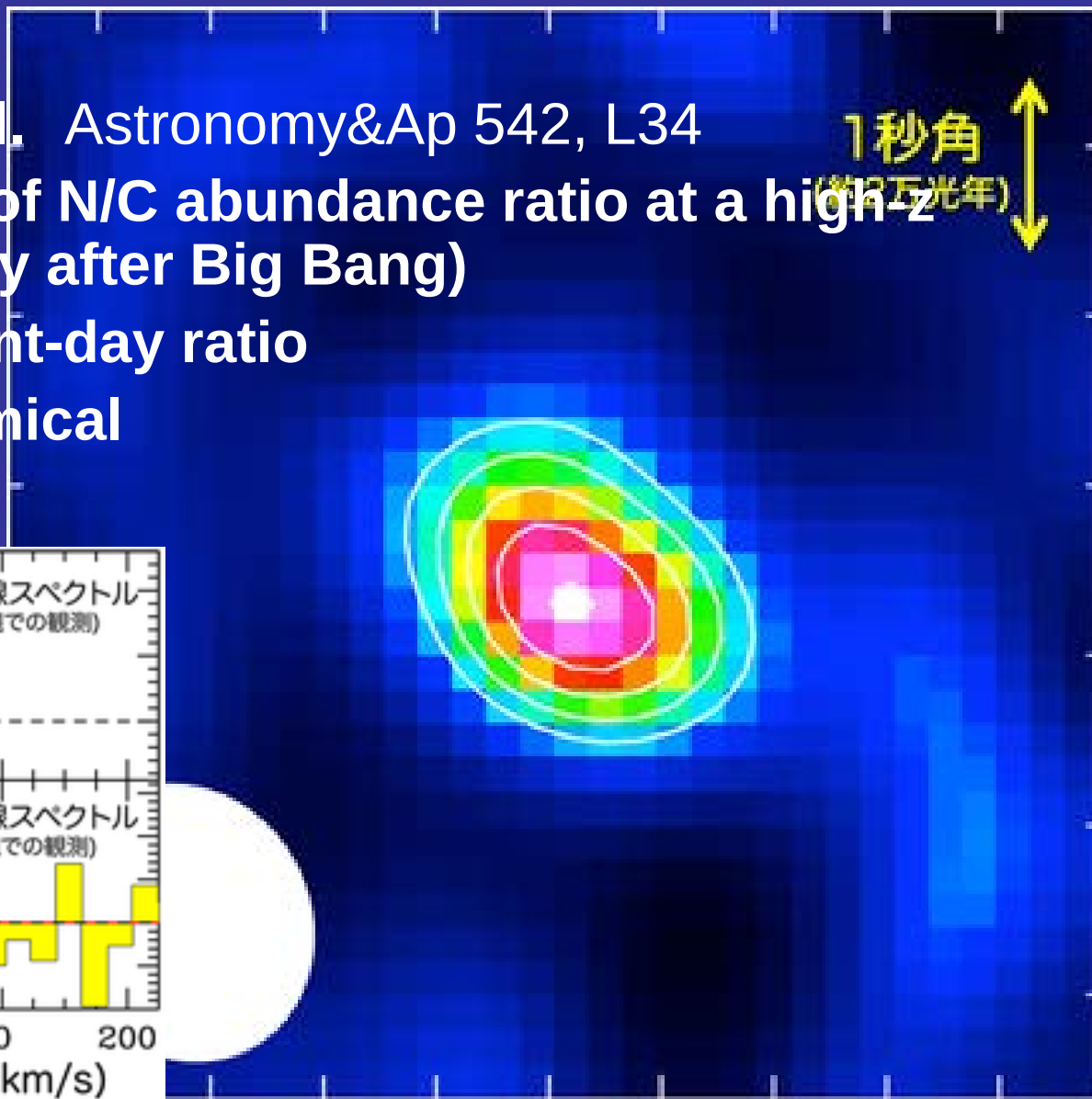
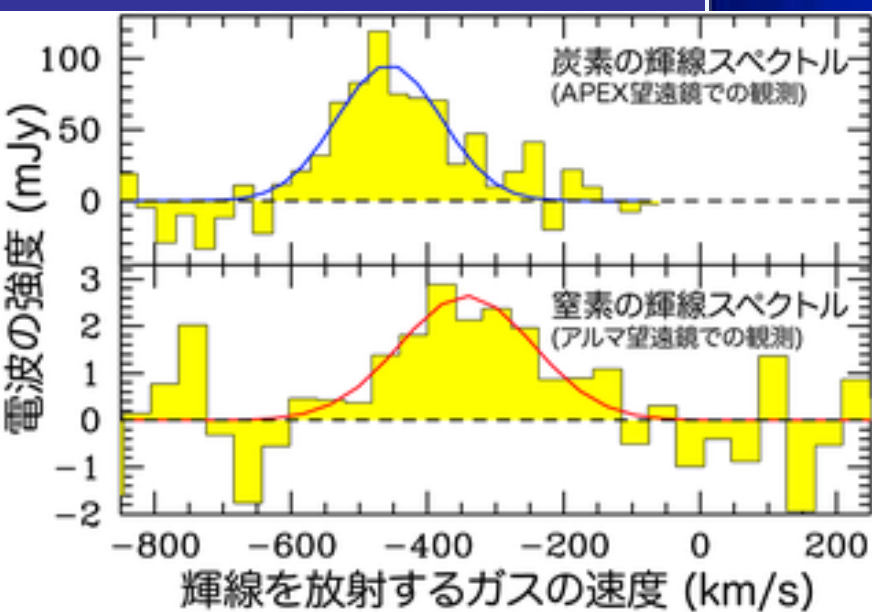
- OT will tell whether you need the ACA, based on the Largest Angular Scale (LAS)
- 7m array
 - # of configurations = 2
- TP array
 - No continuum
 - No band 9 (because of the DSB Rx)
- Multi-configuration observations
 - OT will tell you the number of 12m configs from the requested resolution and LAS.
 - OT will calculate the total time

Correlator

- Max 16 spectral windows (4 SPW x 4 basebands)
- Each baseband can have different correlator modes, but each SPW must use the same correlator mode. All of this is limited by the data rate.
- Max data rate = 60 MB/s
- User needs to technically justify data rate higher than 6 MB/s
- pre-smoothing (binning) of data in the correlator is possible, to reduce the data rate.

Chemical Evolution of Galaxy

- Nagao (KyotoU) et al. Astronomy&Ap 542, L34
- First measurement of N/C abundance ratio at a high- z galaxy ($z=4.76$, 1.4By after Big Bang)
- Similar to the present-day ratio
- Implies a rapid chemical





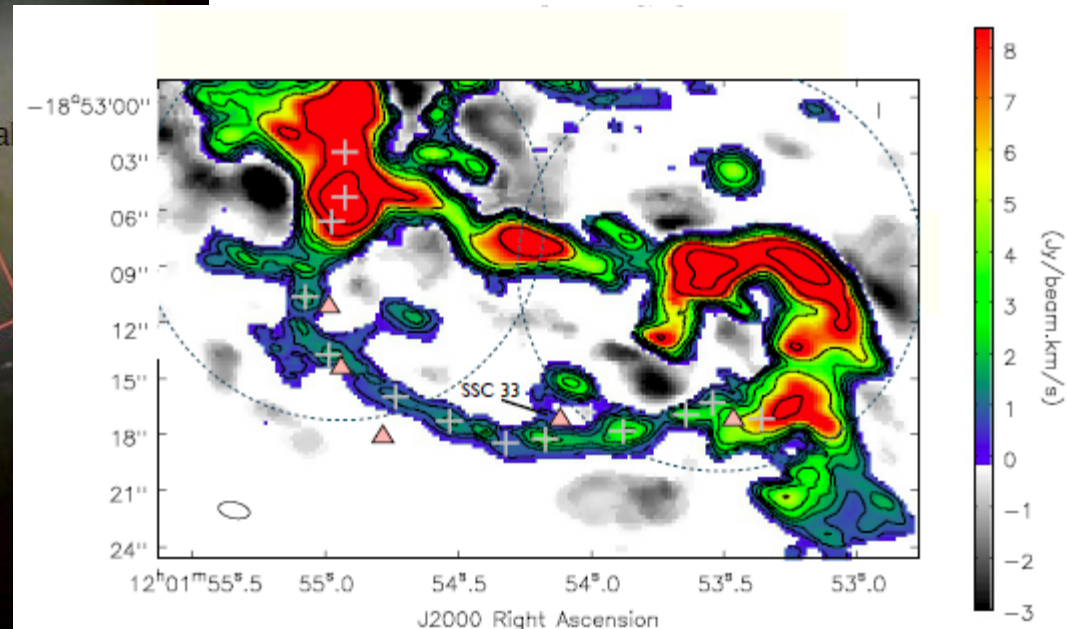
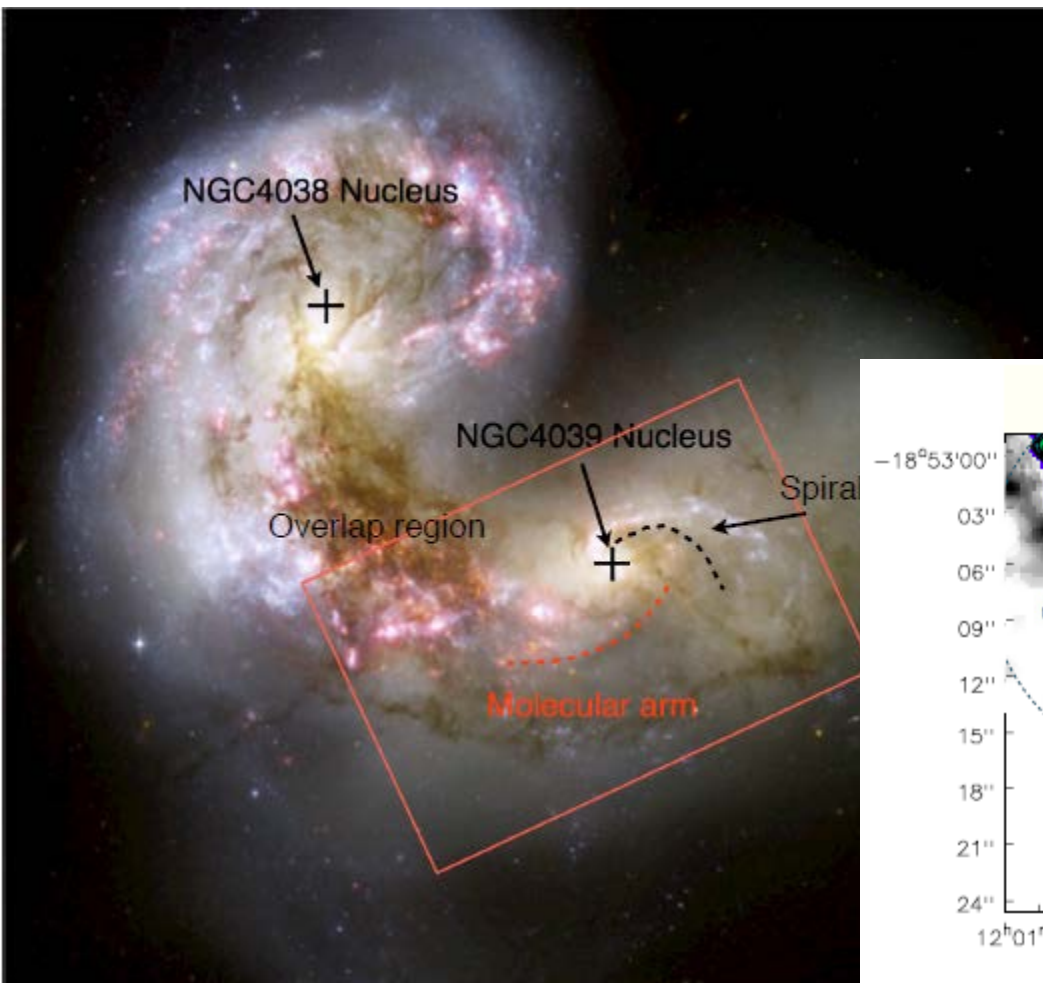
Colliding “Antennae Galaxy”

D. Espada, S. Komugi, E. Muller, K. Nakanishi, M.

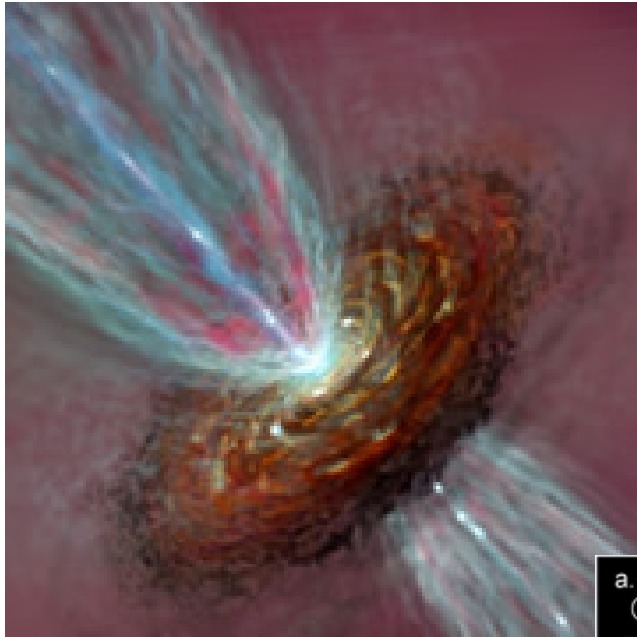
Saito, et al. 2012

Astrophys. J.

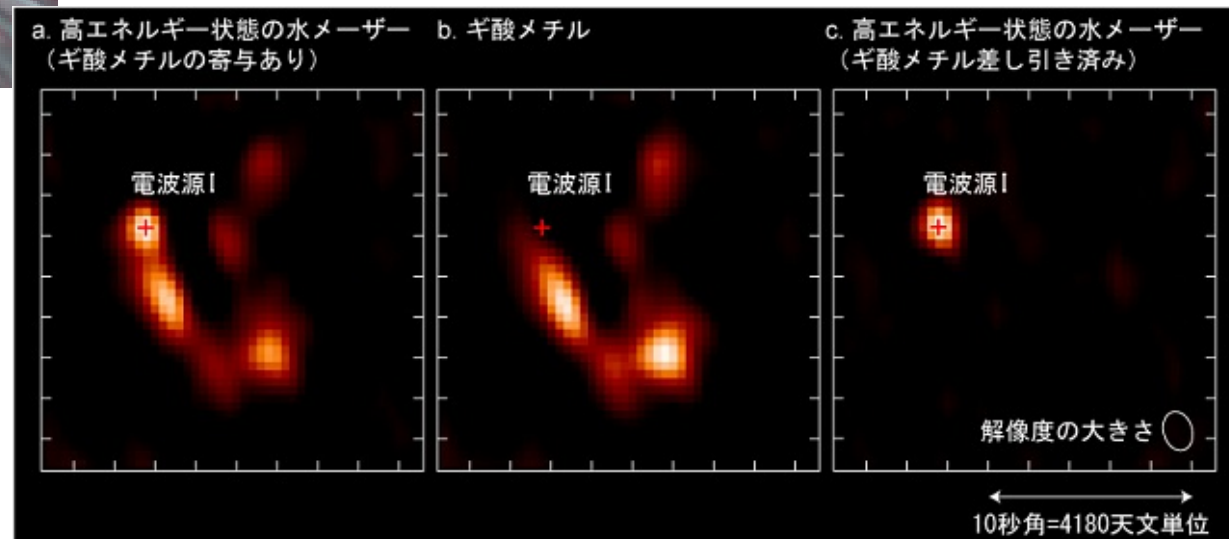
- It is found that SFR increased by an order of magnitude by the tidal effect in colliding galaxies



Discovery of vibrationally excited H₂O maser in YSO



- New probe for star formation studies
- T. Hirota, M.K. Kim, M. Honma, *Astrophys. J.* 757, L1

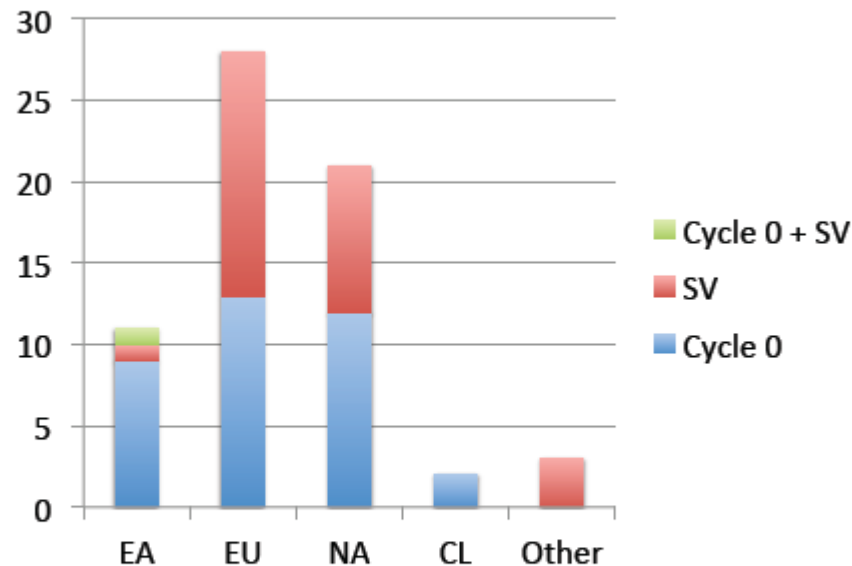




Refereed papers from ALMA

PI data vs public data

Current Stats (2013/9/12)



Regional statistics	Cycle 0	SV	Cyc0+SV	total	fraction	
EA	9	1	1	11	0.17	
EU	13	15	0	28	0.43	
NA	12	9	0	21	0.32	
CL	2	0	0	2	0.03	
Other	0	3	0	3	0.05	
total	36	28	1	65		



Google “EA-ARC Guidebook”



EA-ARC ALMA ARCHIVE DATA
USER GUIDEBOOK

- Prepared by James Chibueze (EA ARC)
- How to get FITS and raw
- How to get CASA
- Reduction environment in Mitaka



Prepared by

James O. Chibueze



www.alma.info

The Atacama Large Millimeter/submillimeter Array (ALMA), an international astronomy facility, is a partnership among Europe, Japan and North America, in cooperation with the Republic of Chile. ALMA is funded in Europe by the European Organization for Astronomical Research in the Southern Hemisphere, in Japan by the National Institutes of Natural Sciences (NINS) in cooperation with the Academia Sinica in Taiwan and in North America by the U.S. National Science Foundation (NSF) in cooperation with the National Research Council of Canada (NRC). ALMA construction and operations are led on behalf of Europe by ESO, on behalf of Japan by the National Astronomical Observatory of Japan (NAOJ) and on behalf of North America by the National Radio Astronomy Observatory (NRAO), which is managed by Associated Universities, Inc. (AUI).