

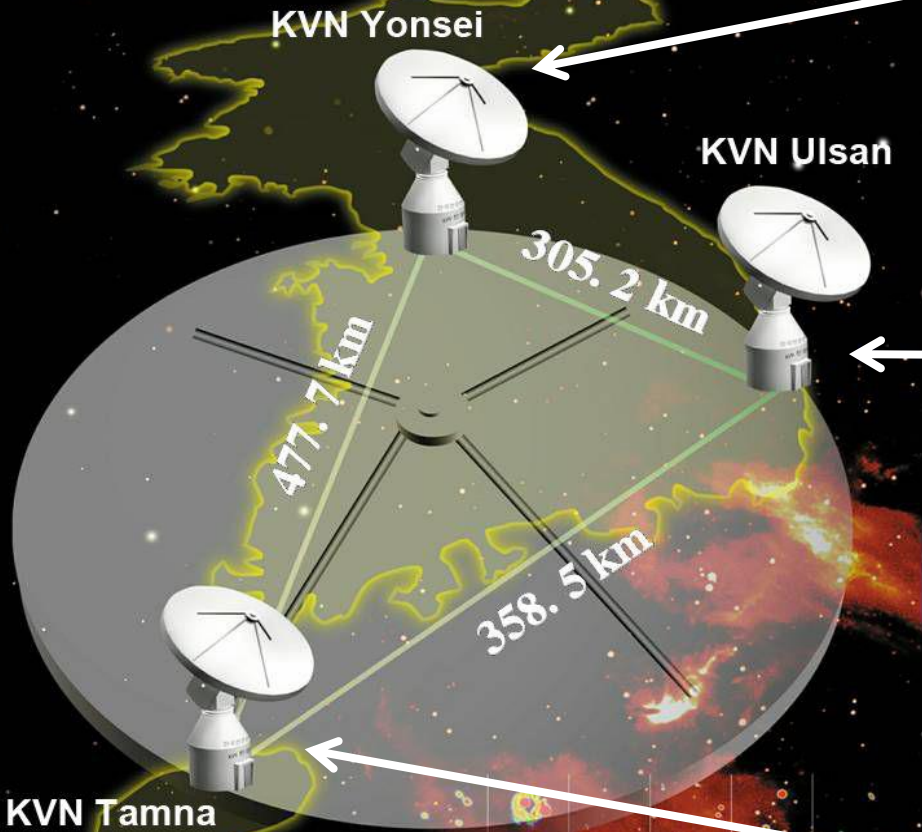
Current Status of KVN

Chungsik Oh

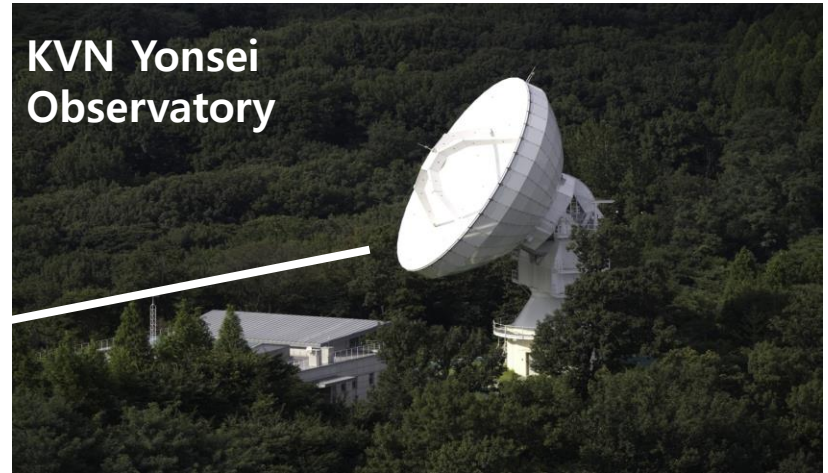
KASI

@ 2013 VERA User's meeting

KVN 한국우주전파관측망 Korean VLBI Network



KVN Yonsei
Observatory



KVN Ulsan
Observatory

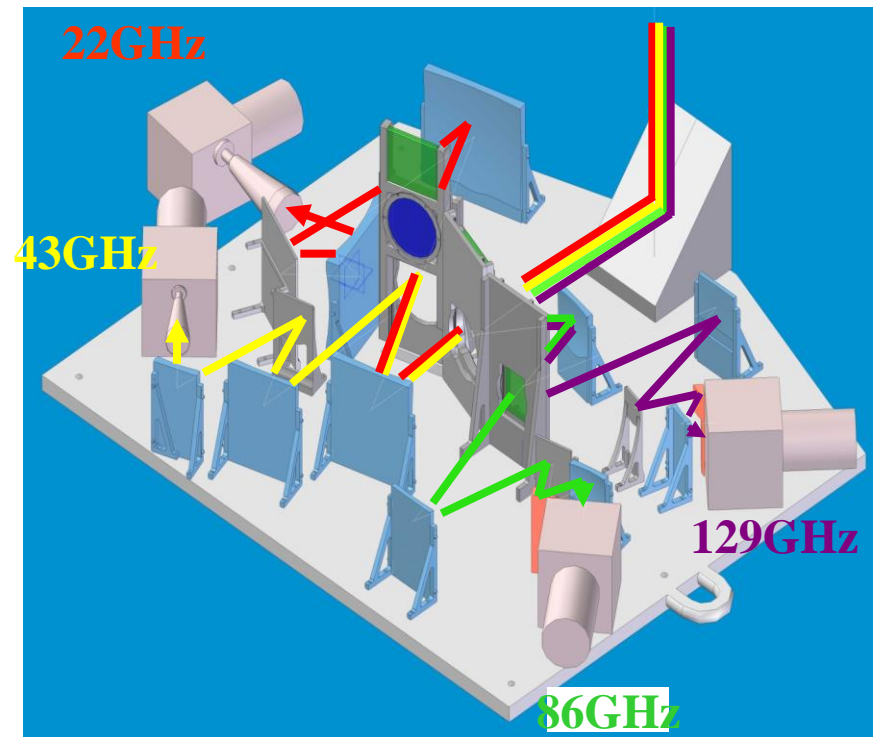
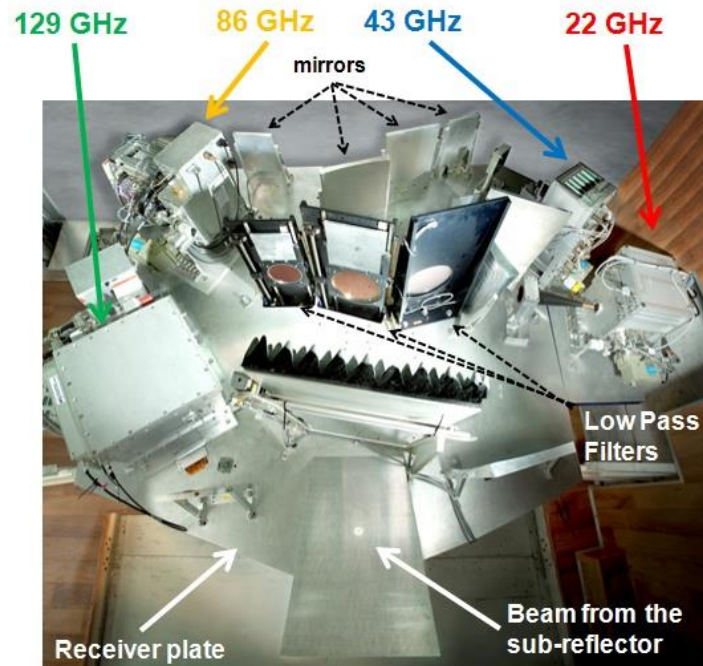


KVN Tamna
Observatory



Multi-Frequency Receiving System

- Simultaneous Multi-frequency Observation
 - @ 22/43/86/129GHz
 - To compensate atmospheric phase fluctuation using phase solution of low frequency



Baseline Sensitivity

Base Line Sensitivity

@BW = 256MHz

Band	Frequency (GHz)	Tsys (K)	Gain [Aeff] (K/Jy)	SEFD (Jy)	t_int (sec)	ΔS (5σ) (mJy/beam)
K	21.25-23.25	100	0.078 [0.60]	~1300	100	60
Q	42.11-44.11	150	0.078 [0.60]	~1900	60	110
W	85-95	200	0.062 [0.50]	~3200	30	270
D	125-142	250	0.043 [0.35]	~6000	30	470

Need Phase Referencing for longer integration time
: Mutli-Freq PR(MFPR), Fast Position Switching

6.7GHz(C), 8GHz(X) at Ulsan

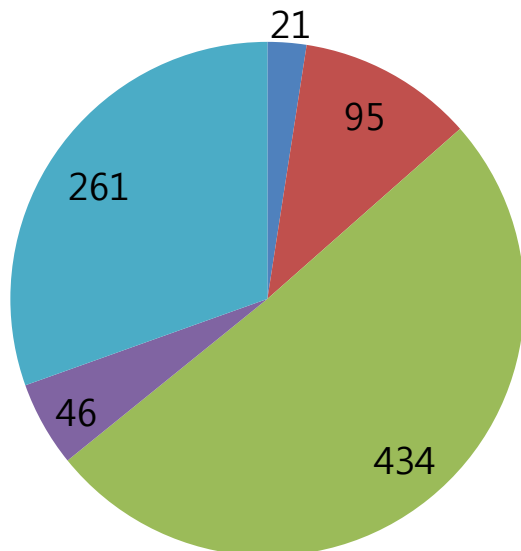
- Aperture Efficiency : ~ 60%
 - w/ Cas A, Tau A
- Beam Size
 - 7.3' @ 6.7G
 - 6.0' @ 8.3G
- $T_{\text{sys}} \sim 250\text{K}$
 - Trx at Horn $\sim 100\text{K}$
 - Trx /w Cal Chopper $\sim 200\text{K}$
 - due to large spillover ~ 0.7
- SEFD : $\sim 3300\text{Jy}$
- LCP only , Simultaneous observation 6.7 & 8.3GHz.
- Pointing EL offset : $+90^\circ$ w.r.t. K,Q,W,D
- Manual setting of mirror
- Fringe Test : 9/24 (EAVN+Sejong 22m)



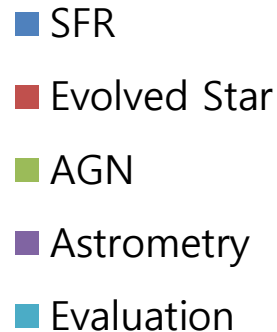
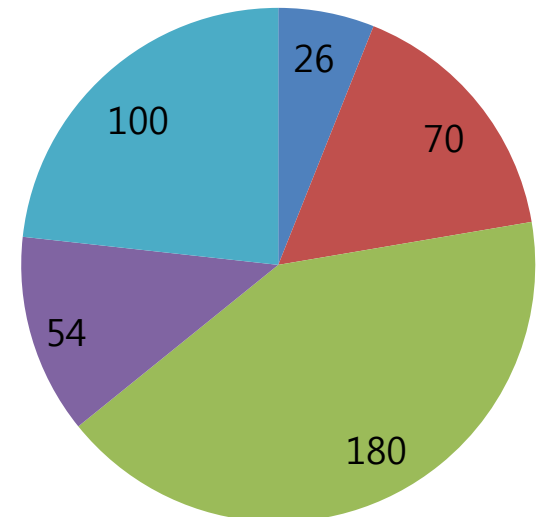
Operation Summary of 2012-13 Season

- 2012.9 – 2013.6
- 22(K), 43(Q), 86(W), 129(D)GHz bands operation
- Total Operation Time ~ 4200 hr (incl. VLBI+S.D.)
- VLBI Operation Time ~ 1300 hr

KVN Alone : ~850hr

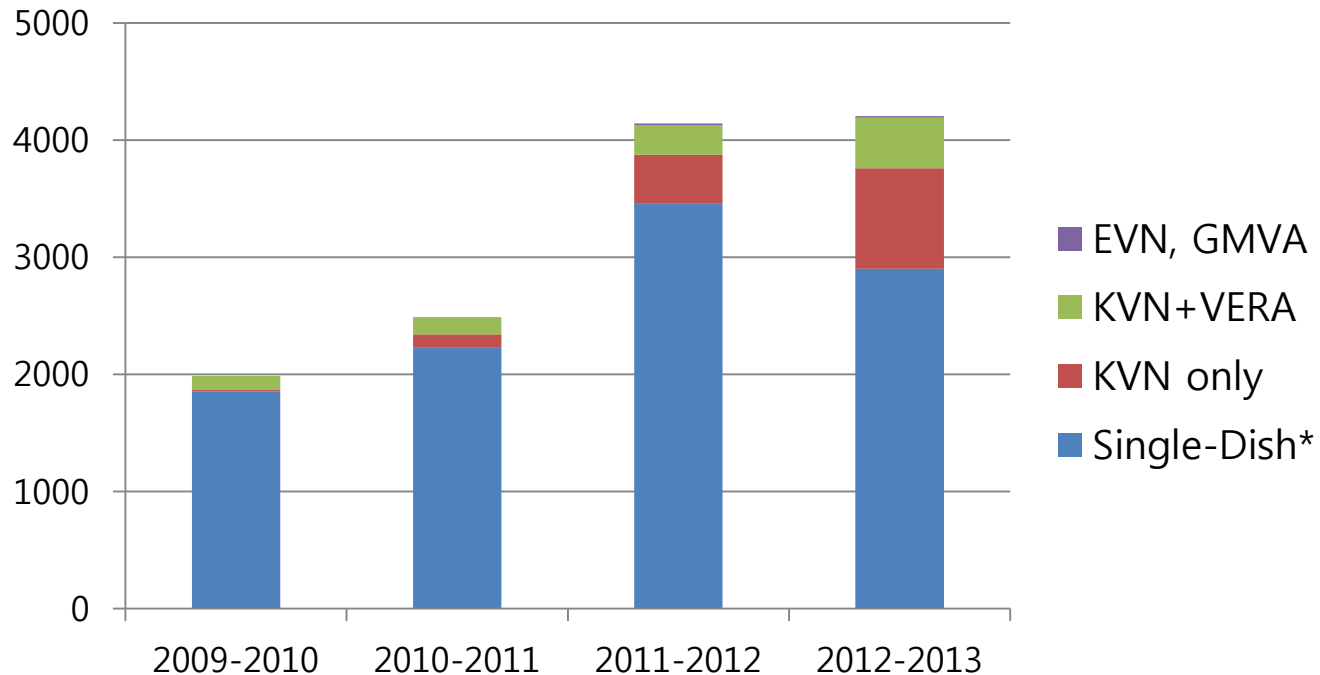


KVN+VERA : ~430hr



4-year Operations

- VLBI operation time is increasing rapidly
- VLBI time of next year : ~3000h



KVN Proposal Call

- 2 times / year
- Season A (Jan-Jun), Season B (Aug-Dec)
- Proposal deadlines :
 - 2013 July for 2013B
 - 2013 Oct for 2014A
 - Feb and Aug from 2014

Open Use Plan

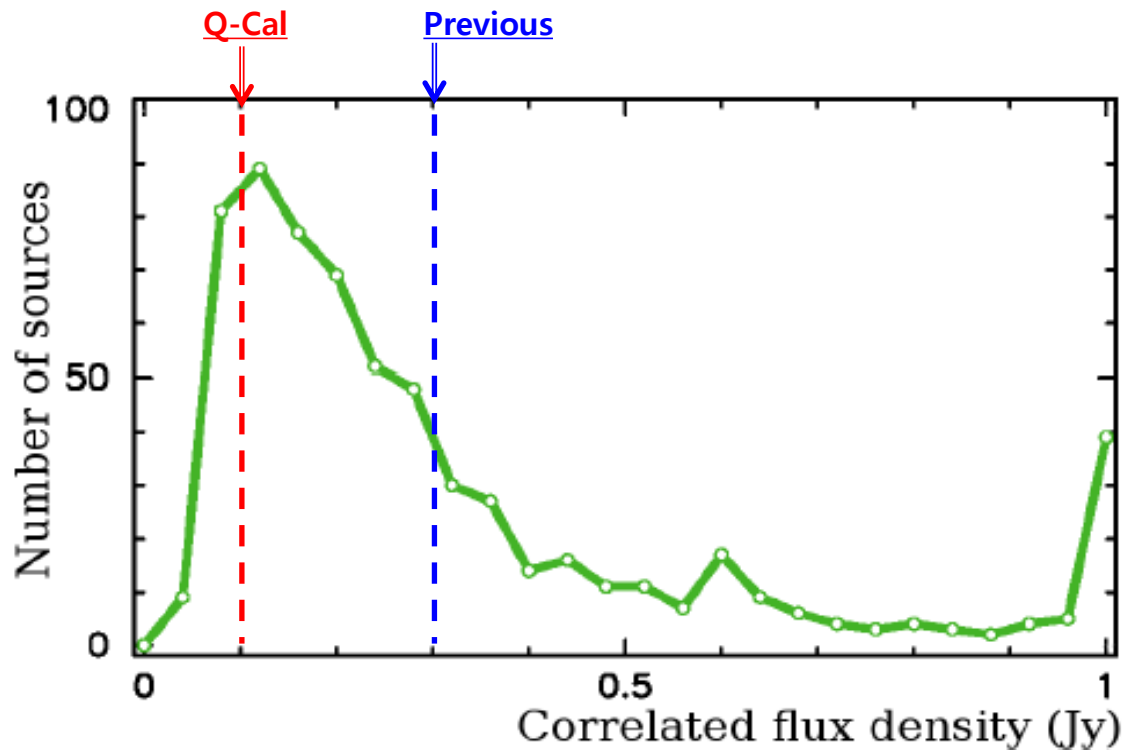
- KVN (VLBI)
 - 2013 Aug-Dec (2013B): Open to Korea
 - K,Q : All Users
 - W,D : Internal users
 - 1500h : KVN 1000, KVN+VERA 500
 - 2014 : International Open
 - K,Q,(W,D)
- KVN+VERA Open Use
 - 2014 Jan (tentative)
 - Open to Japan and Korea, ~500h
 - Imaging Observation
 - Astrometry and phase reference need more test

2013B proposals (deadline 07-01)

- A first open for proposals of the KVN single and VLBI observations to domestic astronomers
- 8 TAC (including one foreigner)
- 2013-08-15 ~ 2014-01-15
- 2000 Hours
 - VLBI(+test) 50%, KVN+(VERA) 25%
 - Single 25%
- **14/17** (13I+4E) Single, **15/17** (13I+4E) VLBI

Fringe Survey

- Q-Cal : 43GHz AGN Fringe Survey (Petrov , Lee, et al. AJ 2012)
 - detected fringe from 637 sources among 799 (78%)
 - 43GHz Detection Threshold: $\sim 100\text{mJy}$ (5σ)
 - Expand the number of Q-band calibrators from 150 to ~ 800



K-band Fringe Survey : AGN team

44 GHz Methanol Maser Fringe Survey : SFR team

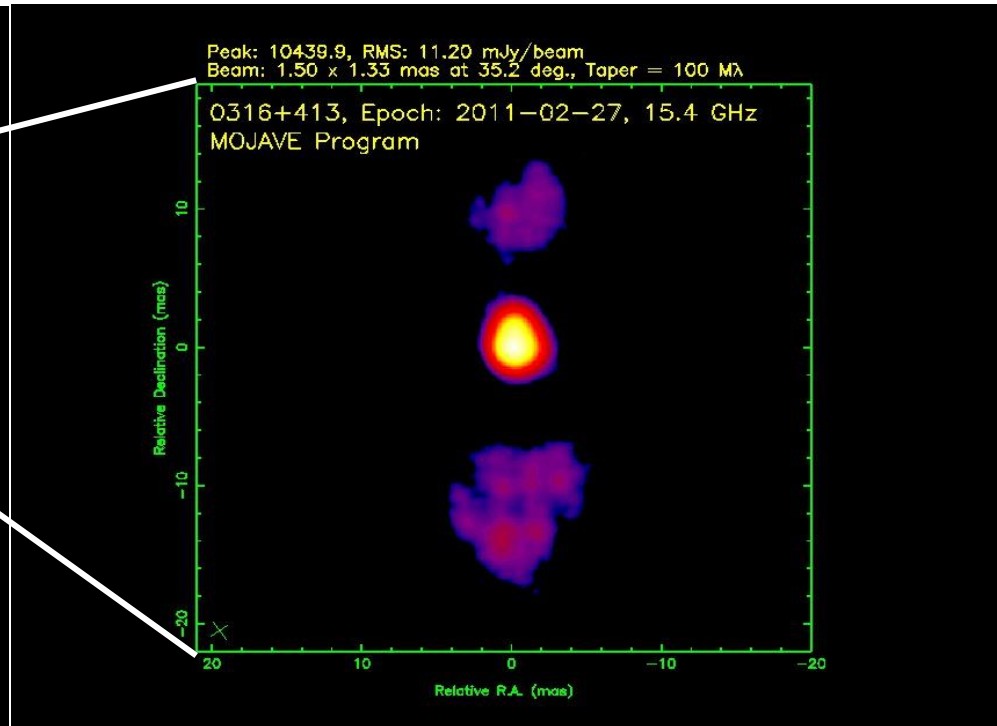
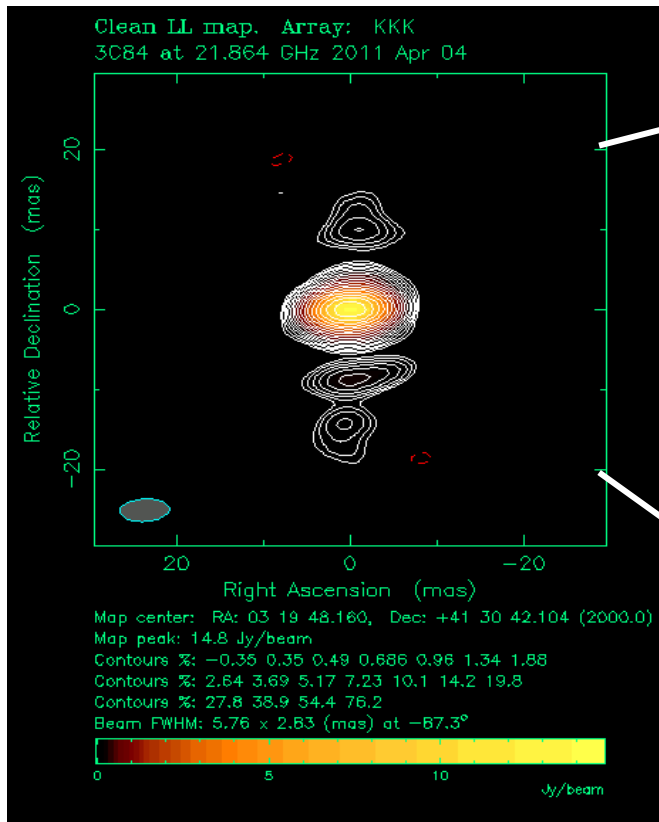
KVN : 3C84 Images @22GHz

Total Integration Time = 9h, BW = 128MHz

clean map peak : 14.8 Jy/bm, rms : 12.5 mJy/bm, peak/rms ~1200

Beam FWHM : 5.3 x 3.5 (mas) at 89.8deg

- KVN-22GHz
- VLBA-15GHz



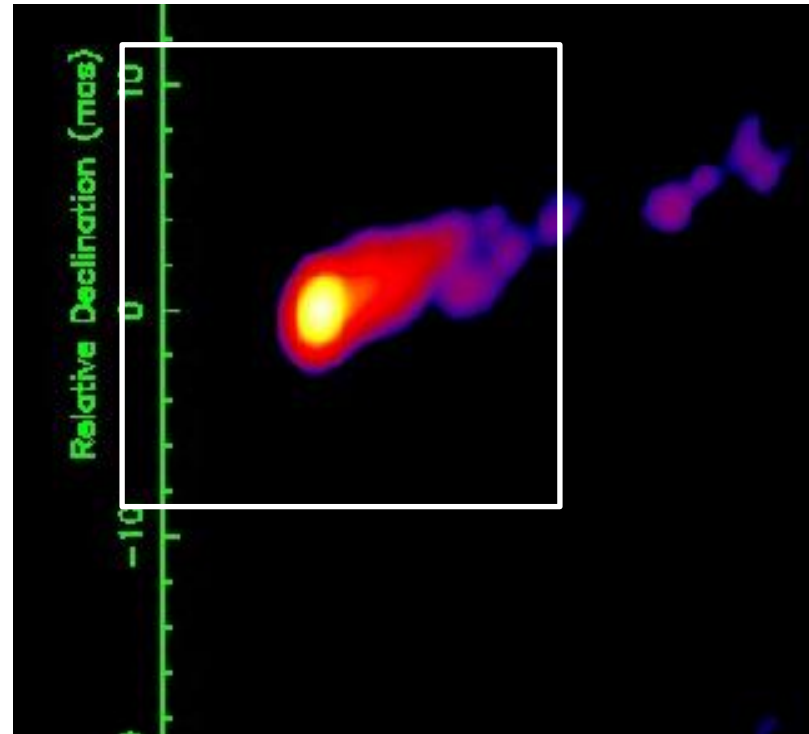
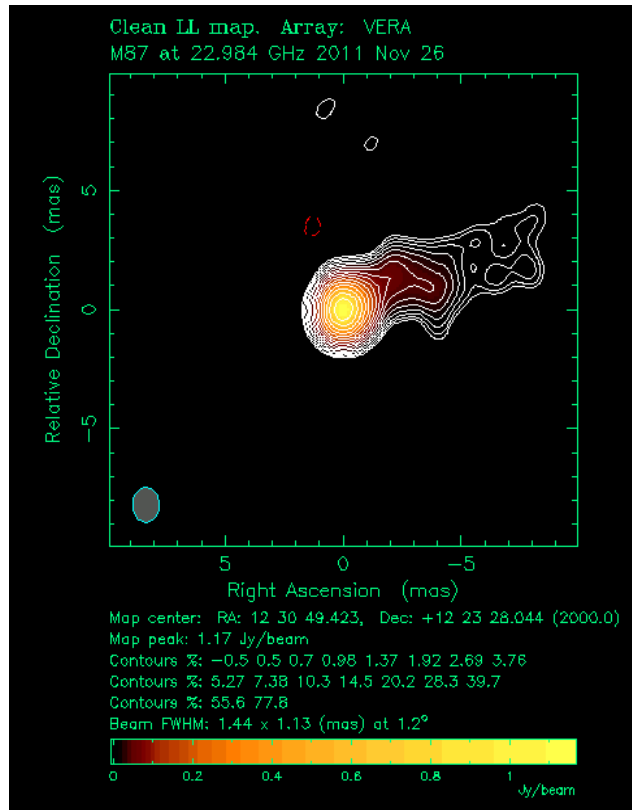
KVN+VERA : M87 Images@22GHz

Int. time=1h, **BW=32MHz**

clean map peak: 1.17 Jy/bm, rms: **1.7** mJy/bm (**1.4**), peak/rms~ 700

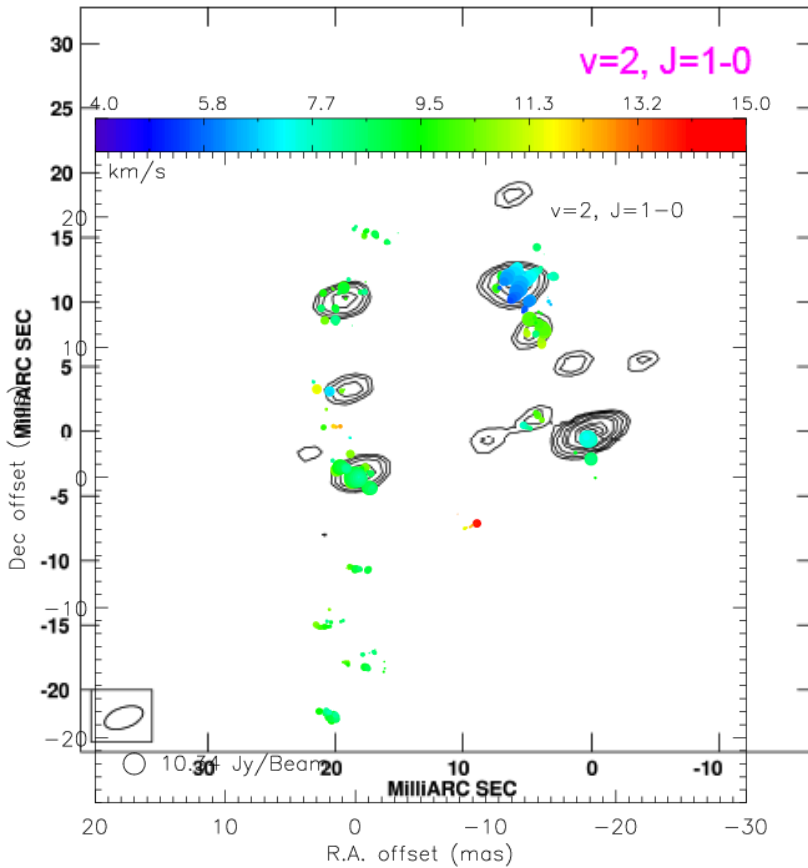
Beam FWHM : 1.4 x 1.1 (mas) at 1.2deg

- KVN+VERA@22GHz
- VLBA@15GHz

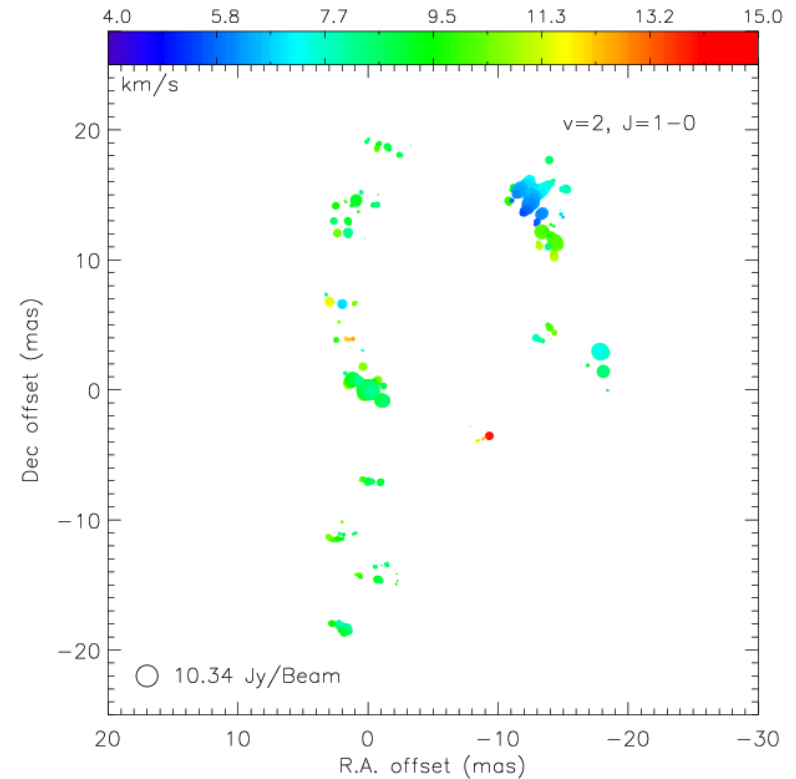


KVN Imaging Capability : Maser

KVN Alone



KVN+VERA



SiO masers of WX Psc

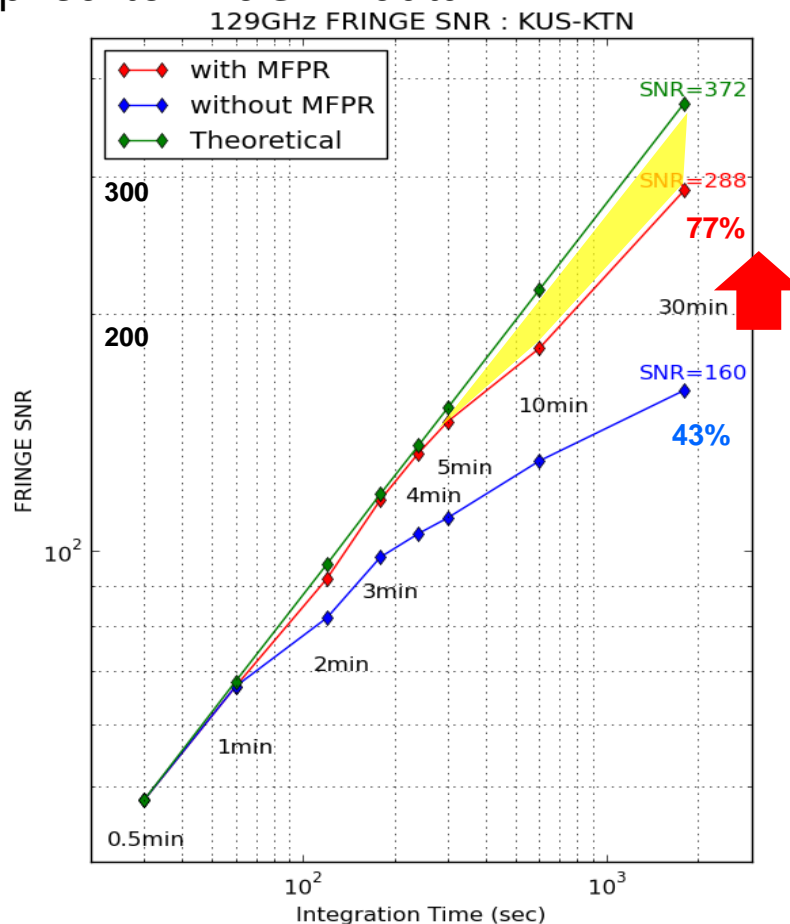
SNR Comparison @ 130 GHz FRINGE SNR

Multi-Frequency Observation : 22, 43, 86, 129 GHz

Target : 3C279

Phase solution of 22GHz data is applied to 129GHz data

$$\Phi_{129, \text{corrected}} = \Phi_{129} - \Phi_{22} \times \left(\frac{\nu_{129}}{\nu_{22}} \right)$$



Astrometry Performance

- Need more test
- Station Coordinate
 - IVP measurement using dual-band GPS
 - Position Error ~ 5cm
 - KVN+VERA 22GHz Geodetic VLBI
 - Position Error < 5 cm
 - Regular Observation with ~3 month interval
- Permanent Dual-band GPS at all KVN stations
 - Zenith-WET Delay, TEC
 - Monitoring Station Motion

Summary

- **KVN open !**
 - to Korea Users from Aug 2013
 - to All Users from 2014
- Available Observation
 - Fringe Survey and imaging in multi-Freq
 - MFPR and Fast Position Switching

Hope All of You Enjoy KVN Observation



Thank you