



Status Report from The Korean VLBI Network

VERA User's Meeting, Oct. 3-4, 2012

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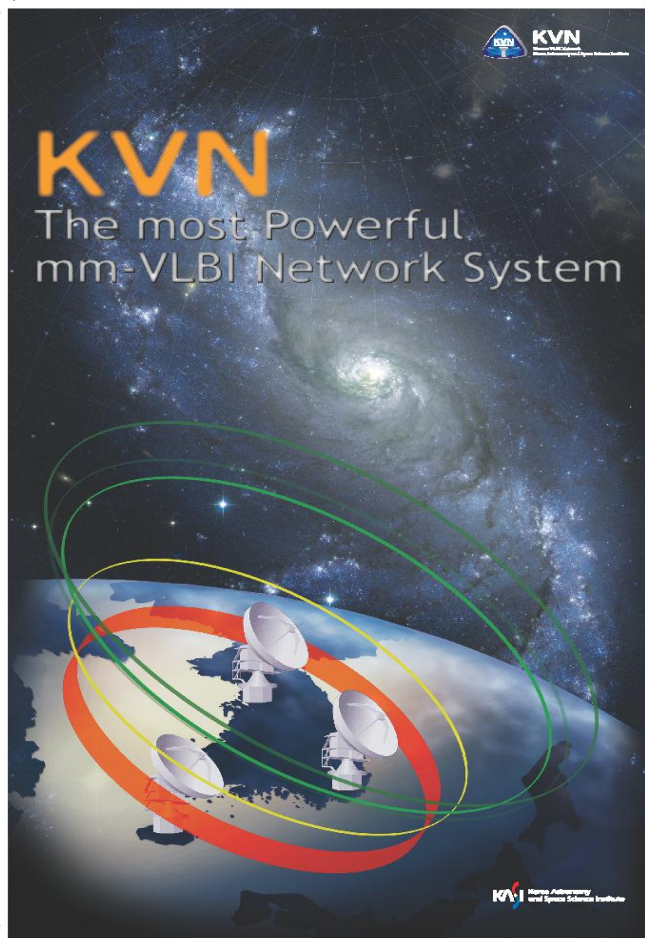


- ◆ **Korean VLBI Network**
- ◆ **Main Items of 2012**
- ◆ **KVN Test VLBI Observations**
- ◆ **Single Dish Observations**
- ◆ **Main Plan of 2012-2013**
- ◆ **Invitation of Post-Doc & Senior Researchers**

Korean VLBI Network : KVN



- Spatial Resolution of **KVN** ~ 3 mas at 43 GHz
~ 1 mas at 129 GHz



KVN Yonsei



KVN Tamna



KVN Ulsan

- **2009**
Start of single dish obs. at 22/43GHz bands (May)
Fringe detections of KVN 3 stations (Oct.)
- **2010-2011**
VLBI test obs. at 22/43GHz bands
Installation start of 86/129GHz RXs (May 2011)
- **2012**
Fringe detections of 4 bands (April)
Start of KVN+VERA test VLBI obs.
Removal of KVN office from Seoul to Daejeon (July)

Main Items of 2012



❖ The start of 86/129 GHz band observations

- Full equipment of 4 band simultaneous observational system
 - 4 BBCs, samplers at 3 stations, new IF selector
 - Beam alignment, pointing model, hexapod model etc.
- The start of single dish research observations at 86GHz/129 GHz bands
- Simultaneous detections of fringe at 4 bands (22/43/86/129 GHz)

❖ Upgrade of efficiencies at 86GHz/129GHz bands

- Movement ahead of receiver plates (Aug.) > Under efficiency measuring

❖ Upgrade of antenna position accuracy

- Yonsei : 10cm (GPS)
→ 5cm (GPS&VLBI)
- Ulsan, Tamna : 50cm~1m
→ 5~10cm (GPS)

❖ System upgrade

- Installation of round trip system
- Mark5B Disk Module Upgrade
 - PATA -> SATA

Aperture Efficiencies (%) (the first half of 2012)				
	22G	44G	86G	129G
Yonsei	65	63	48	30
Ulsan	62	62	49	32
Tamna	59	62	52	40

◆ Removal of KVN office and Correlator from Seoul to Daejeon in 2012 July

Bird's-Eye View of East Asian VLBI Research Center (Daejeon H. Q.)



VLBI center BD was completed in 2012 June

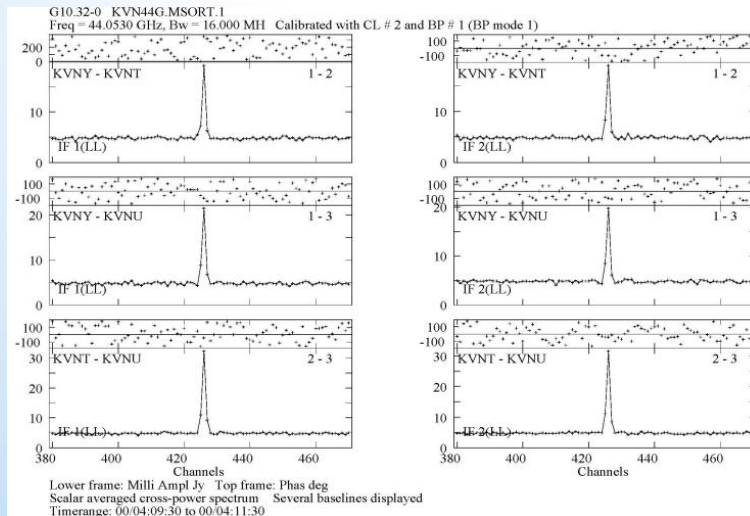
Completion Ceremony in Sept. 13, 2012



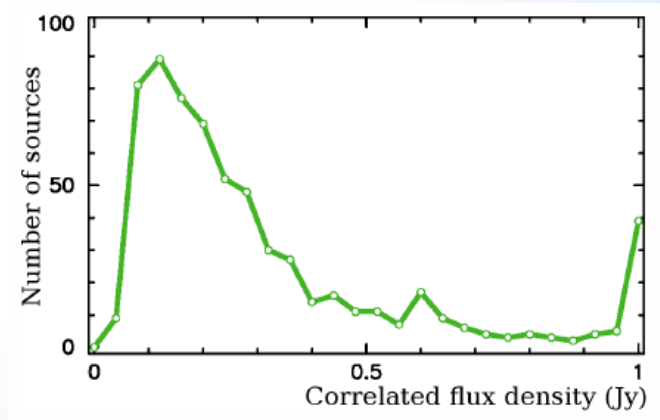
KVN Test VLBI Observations (2011 Sept. - 2012 May)



- **Star formation region** : Fringe survey of 44 GHz methanol maser
 - ▶ FRINGEs were detected from 12/36 sources (from G10.32 , G18.34, G49.49, fringes detected at all three KVN baselines).
- **Evolved star** : Simultaneous obs. of 22/43/86 GHz toward 6 strong SiO/H₂O maser sources
- **AGN** : K & Q-band fringe survey > Catalog of correlated flux densities for 637 sources at Q-band (2012 AJ)



FRINGEs from G10.32



Results of Q-band fringe survey

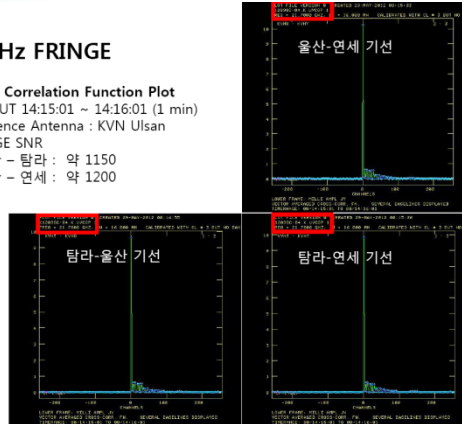
KVN Test VLBI Observations : Simultaneous Fringe Detections at 22/43/86/129 GHz Bands



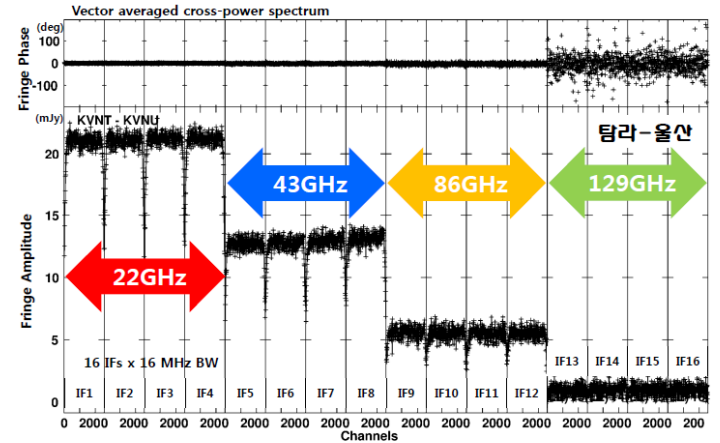
❖ Phase compensation obs. for 4 band simultaneous operation

22GHz FRINGE

- Cross Correlation Function Plot
- Time UT 14:15:01 ~ 14:16:01 (1 min)
- Reference Antenna : KVN Ulsan
- FRINGE SNR
 - 울산 - 탐라 : 약 1150
 - 울산 - 연세 : 약 1200

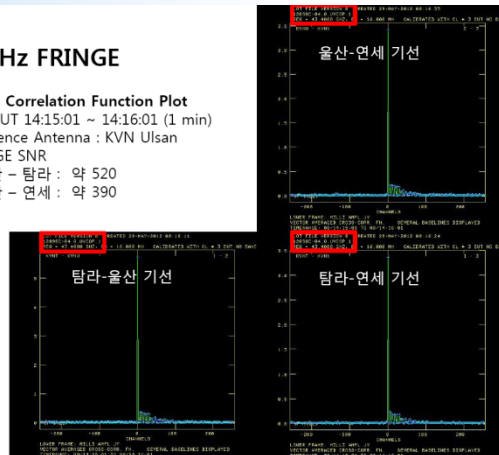


Obs. date: April 7, 2012
Object : 3C279
Correlator : DiFX



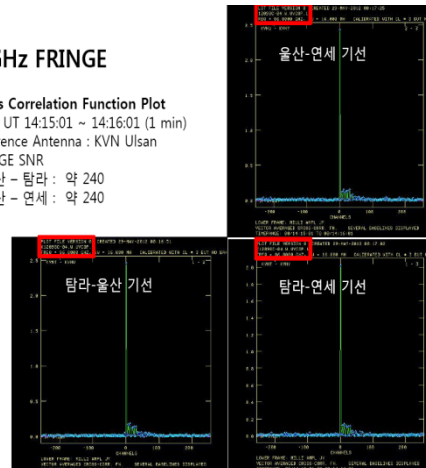
43GHz FRINGE

- Cross Correlation Function Plot
- Time UT 14:15:01 ~ 14:16:01 (1 min)
- Reference Antenna : KVN Ulsan
- FRINGE SNR
 - 울산 - 탐라 : 약 520
 - 울산 - 연세 : 약 390



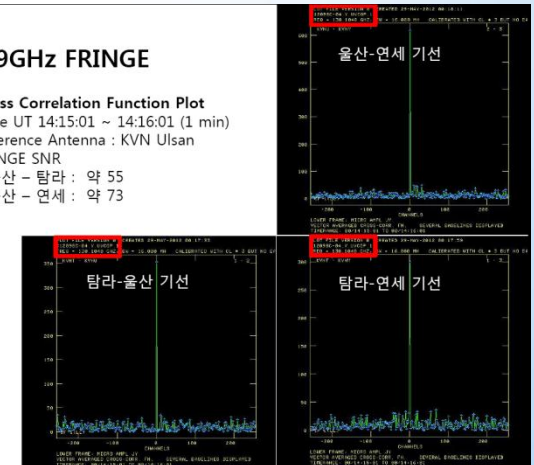
86GHz FRINGE

- Cross Correlation Function Plot
- Time UT 14:15:01 ~ 14:16:01 (1 min)
- Reference Antenna : KVN Ulsan
- FRINGE SNR
 - 울산 - 탐라 : 약 240
 - 울산 - 연세 : 약 240



129GHz FRINGE

- Cross Correlation Function Plot
- Time UT 14:15:01 ~ 14:16:01 (1 min)
- Reference Antenna : KVN Ulsan
- FRINGE SNR
 - 울산 - 탐라 : 약 55
 - 울산 - 연세 : 약 73



KVN Test VLBI Observations (2011 Sept. - 2012 May)

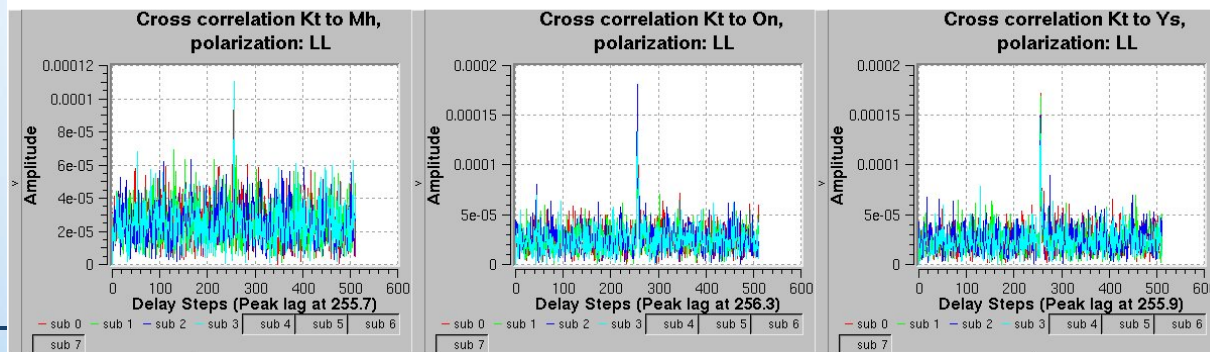


- **Geodetic VLBI observations**
 - KVN+VERA K-band : 2 times
 - KVN K-band
- **GPS measurement of antenna position accuracy**
 - ▶ KVNYS: 10cm > 5cm, KVNUS&TN: 50~100cm > 5~10cm
- **Test observations of e-VLBI (EVN, Australia)**
 - 512 Mbps
- **Test observations with GMVA**
 - Fringe Detection at 86 GHz

Current Fringe plots EVN Correlator at JIVE

2011-10-19 13:05:05

fringe 0 | Fringe 1 | Fringe 2



KVN+VERA Test VLBI Observations for KSPs



- Star Forming Region (Kee-Tae Kim/Hirota-san)
 - 44GHz Methanol Maser VLBI Fringe Detection
 - KVN+VERA 44GHz Methanol Maser Image

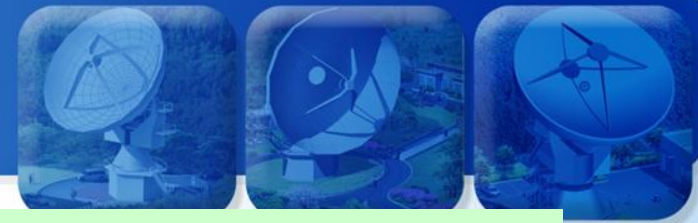
- Evolved Star (Se-Hyung Cho/Imai-san)
 - S Per (H₂O), WX Psc (SiO $v=1, 2$) Multi-Freq Maser Imaging (KVN: 22/43/86 GHz)

- AGN (Bong-Won Sohn/Kino-san)
 - Q-band fringe survey, KVN+VERA M87 Image
 - GENJI, Sgr A

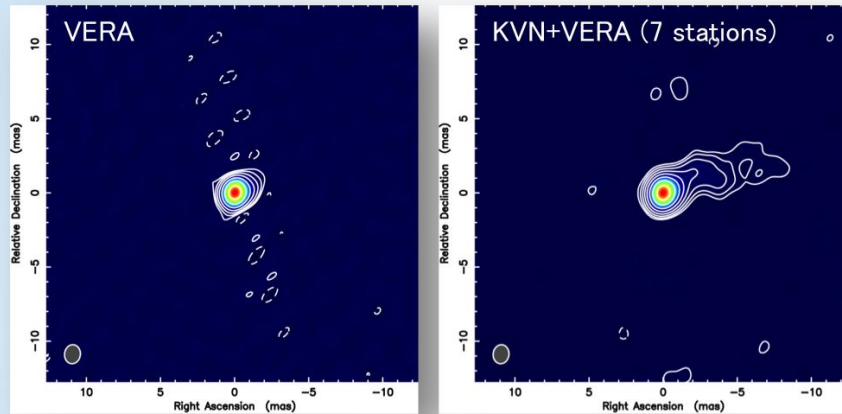
- Astrometry : W3OH (Chung Sik Oh/Nagayama-san)
 - ▶ Joint Science Working Group Workshop

◆ High sensitivity and imaging quality were confirmed

Test Obs. Results Using the KVN+VERA Joint Array



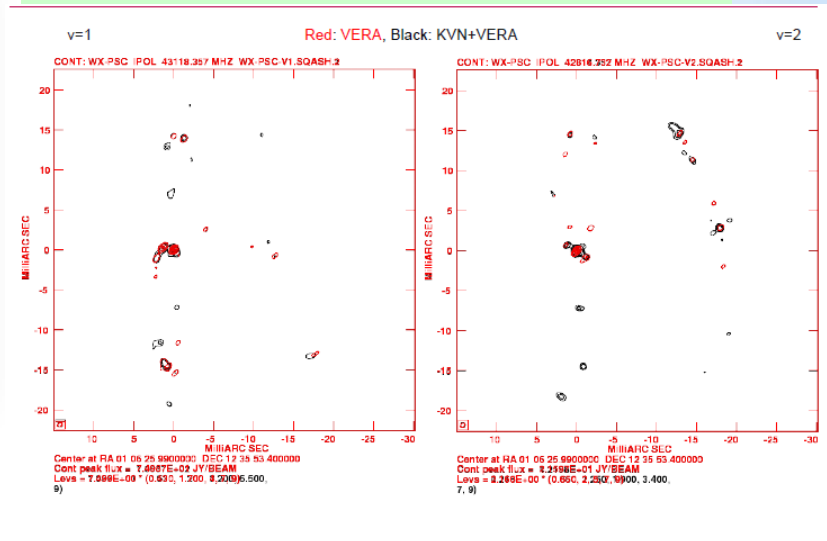
M87(Virgo A) at 22 GHz



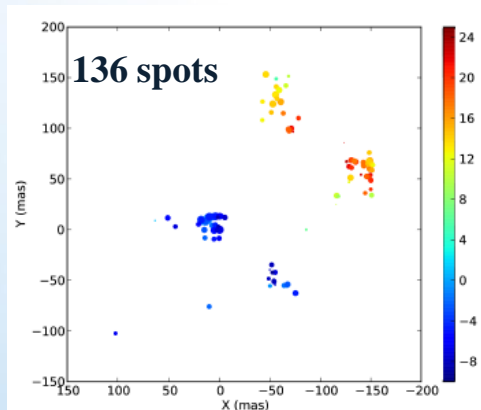
From AGN sub-WG

WX Psc at 43 GHz

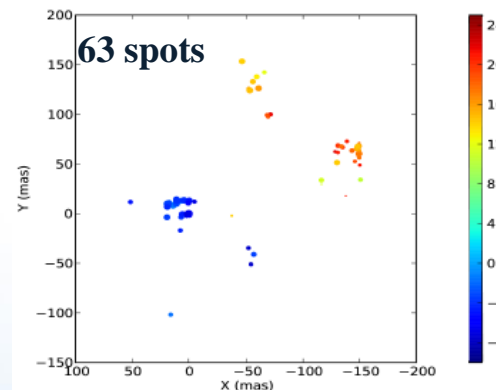
● Obs. date : March 30-April 1, 2012



Orion KL at 43 GHz



KVN+VERA



VERA only

Single Dish Obs. (2011 Sept.-2012 May)



KASI internal projects : ~24

- Star Formation region : 16 (HMSF: 8 , LMSF: 8)
- Evolved Star : 4
- AGN : 4

External projects (from Univ.) : 7

- AGN 5, SF 2

Publications (2010-2012)

System papers : 5

Science papers : 7 (mainly single dish results)

Main Plan of 2012-2013



- ❖ **Scientific VLBI operation : from ~2013 Oct. (target date)**
 - Regular operation of K/Q bands, limited VLBI operation of 4 bands
 - Performance verification of VLBI at 86/129GHz bands, P-Cal test

- ❖ **Regular operation of KJJVC**

- ❖ **System Installation, Test & Upgrade**
 - Receiver system
 - Installation & test of P-Cal system
 - Upgrade of 129 GHz receivers : Image band rejection, exchange of SIS junctions
 - Installation of 6.7GHz RX (Ulsan)
 - Installation of dual-band GPS
 - Monitoring of position movement, wet delay measurement for correlation

Main Plan of 2012-2013



■ Test VLBI Observations

- **Start of observations: the beginning of 2012 Oct.**
 - KVN(+VERA) test observations, 4 band single dish observations
- **Test VLBI observations of 86/129GHz bands**
 - Phase compensation obs. for 4 band simultaneous operation
- Geodetic VLBI observations (KVN+VERA) : 2012 Sept., 2013 Jan. ...
- Polarization VLBI observations : KVN (+VERA)
- e-VLBI test

■ Machine time allocation of KVN (+VERA) : not determined

- KVN-only including single dish operation : ~50 %
- KVN+VERA (+JVN) : ~50 % (~2500 hrs ?)
 - KSP
 - Open Use

■ User support system

- Status report, manual, web Interface
- Support scientists, operators etc.

Invitation of Post-Doc & Senior Researchers



- KASI (distinguished) fellowship program for leader class researchers
 - Application date : at all times
- Brain pool program of National Research Foundation of Korea
 - Application date : Dec.
- Research fellowship for young scientists
(Korea Research Council of Fundamental Science & Technology)
 - Application date : Feb.
- KASI institute post-doc program
 - Application date : 2012 Nov., the first half of 2013
- KASI project post-doc program
 - Application date : at all times
- ◆ **Especially, we would like to invite VLBI researchers !**