

# 東アジアVLBIネットワーク現状 と観測に向けて

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# Background

## East-Asia VLBI Network

Korea : KVN (Yonsei, Ulsan, Tamna)

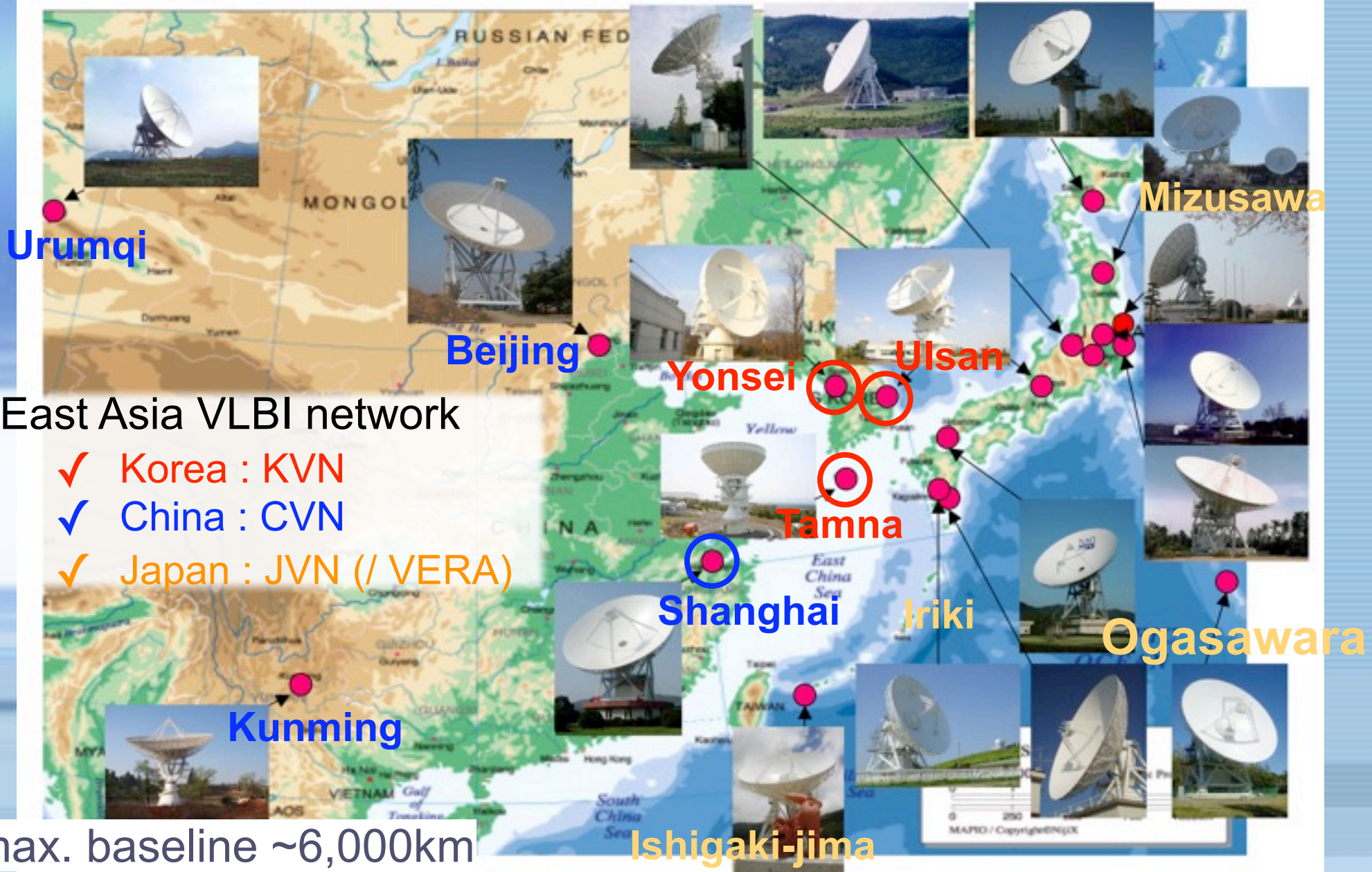
China : CVN (Shanghai, Urumqi, Beijing, Kunming)

Japan : JVN (with VERA)

Different recording systems and correlation processing systems in each VLBI network. We are going to install “**K4/VSOP terminal**” in some antennas in Korea and China in order to construct **the first phase East Asia VLBI network**.

In the future, wideband observation using Gbps recording systems and the KJJVC.

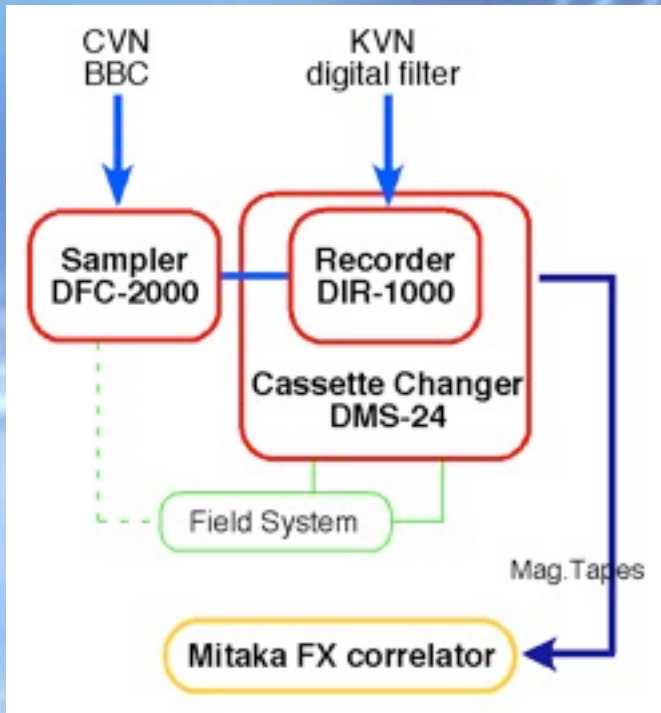
# East Asia VLBI Network array configuration



# K4/VSOP terminal



Sampler  
DFC-2000



Recorder  
DIR-1000



Cassette changer  
DMS-24

## Recording Rate

JVN : 128Mbps (16MHzBW, 2bit, 2ch)

max : 256Mbps (16MHzBW, 2bit, 4ch)

# Korea : KVN

Antenna : 21-m x 3

- Yonsei (延世 in Seoul)
- Ulsan (蔚山)
- Tamna (耽羅 in Jeju)

Frequency :

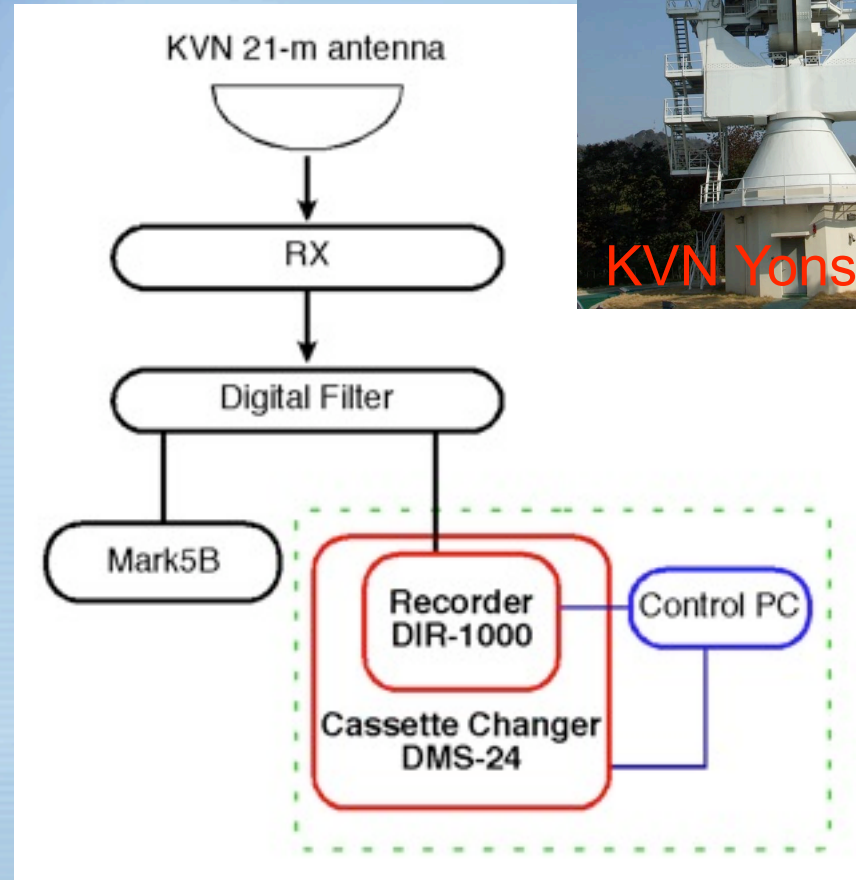
(129/86GHz), 43/22GHz

Terminal : Mark5B,

DIR1000(K4)



KVN Yonsei



- 43/22GHz-bands receivers in Yonsei had installed in Oct. 2008.
- The receivers in Ulsan and Tamna have installed from Sep. to Oct. 2009.

# Korea : KVN

DMS-24, Control PC, etc.  
installed in KVN 3 station



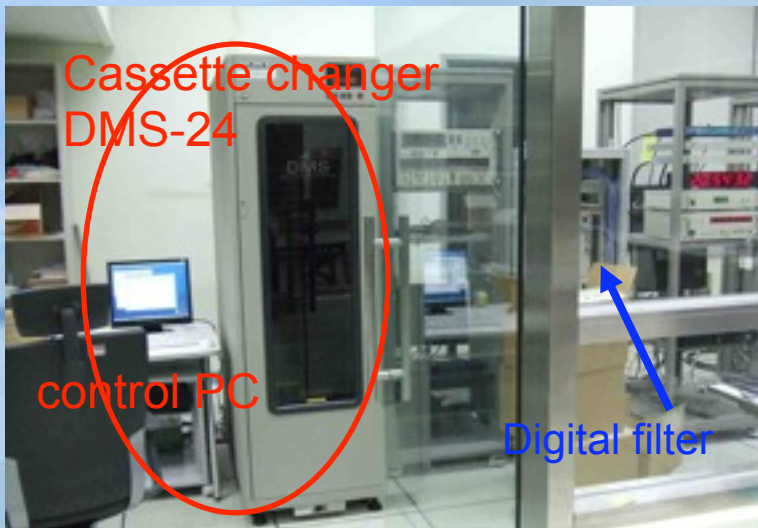
KVN Yonsei



KVN Ulsan



KVN Tamna



Cassette changer  
DMS-24

control PC

Digital filter



# China : Sheshan (Shanghai)

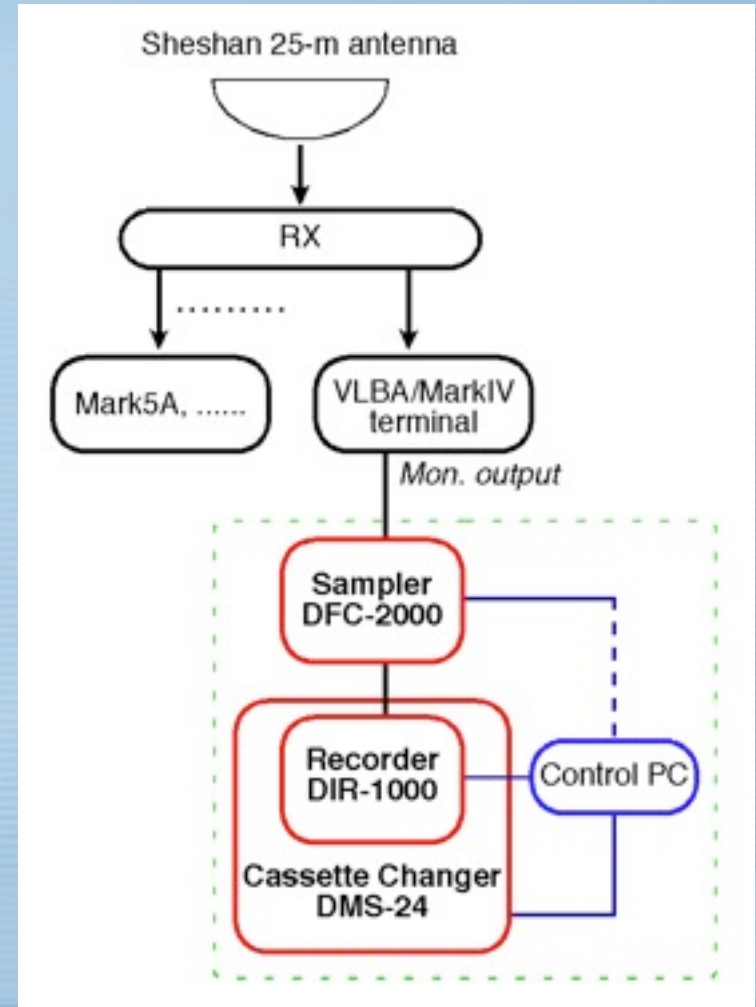


Antenna : 25-m

Frequency : **K**, S/**X**, **C**, L-bands etc.

Terminal : MarkIV/VLBA,  
Mark5A, Mark5B,  
K4(DIR1000)

Now 6.7GHz Methanol maser (C-band) receiver is available.



# China : Sheshan (Shanghai)



Installation of K4/VSOP terminal system  
in Sheshan station





# Korea : KVN



KVN Yonsei



KVN Ulsan



KVN Tamna

## Installation of K-4 terminal

- KVN Yonsei & Ulsan (End of Oct. 2008)
- KVN Tamna (Dec. 2008)

## Fringe detection in test observations

- 1&3 Nov. 2008 (K-band)  
KVN Yonsei+VERA KVN first fringe detection @ K-band
- 12&13 Mar. 2009 (Q-band)  
KVN Yonsei+VERA Fringe detection @ Q-band
- 16/23&22 Oct. 2009 (K/Q-bands)  
KVN Yonsei/Ulsan/Tamna+VERA  
KVN 3 stations K/Q-band fringe detection

Test observation for system evaluation is carried out between KVN and VERA.

# KVN Yonsei-VERA K/Q-band

Nov 1, 2008



Nov 3, 2008



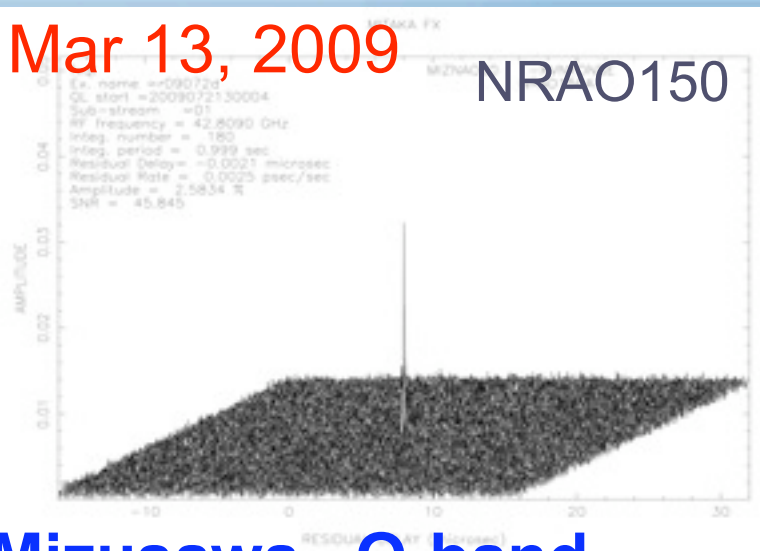
First Fringe of KVN!

KVN Yonsei(Seoul) - VERA Mizusawa K-band

Mar 12, 2009



Mar 13, 2009



KVN Yonsei(Seoul) - VERA Mizusawa Q-band

# KVN 3 antennas - VERA K/Q-band

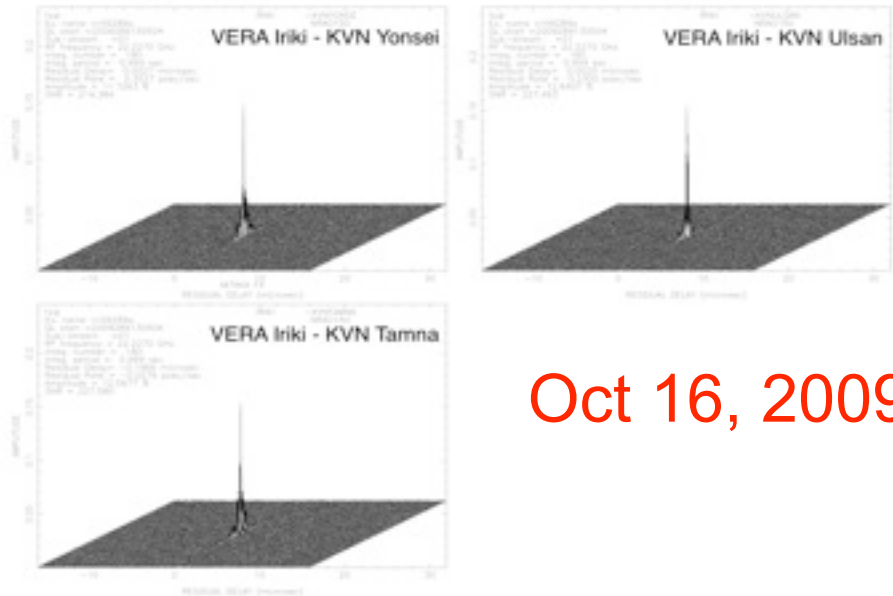
- KVN internal baselines
- VERA-KVN baselines

Fringe detection !

Q-band obs. on Oct 22, 2009  
Fringe detection !

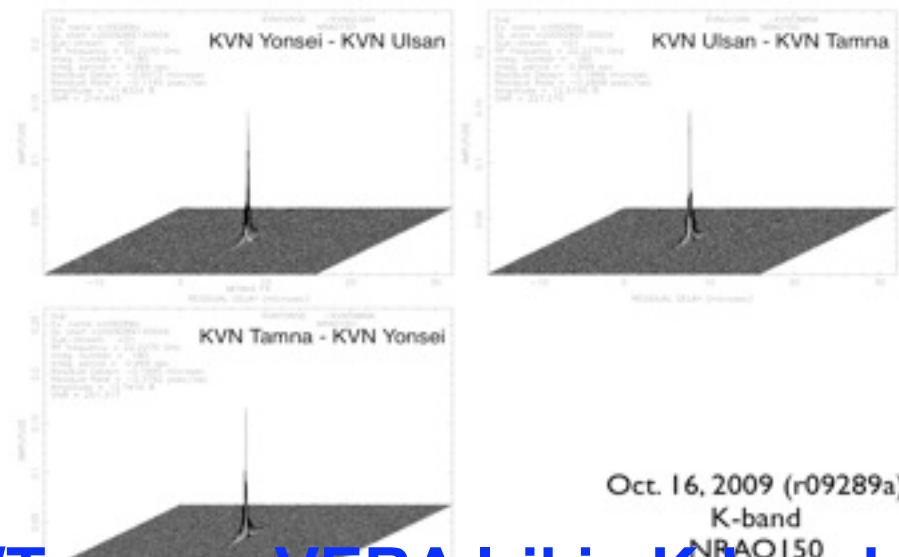
**KVN Yonsei/Ulsan/Tamna - VERA Iriki K-band**

Fringes of KVN-VERA baselines in the K-band



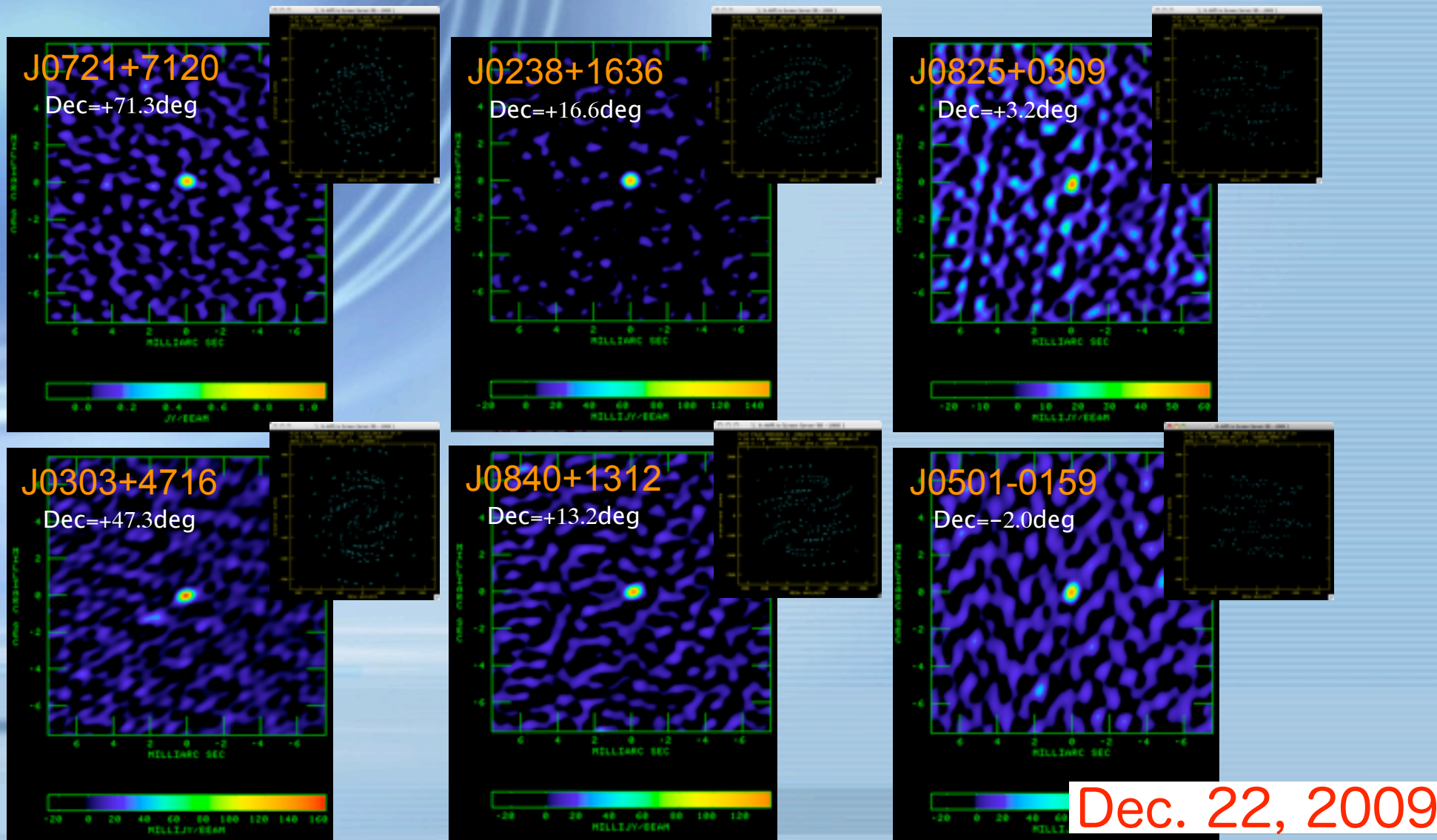
Oct 16, 2009

Fringes of KVN baselines in the K-band



Oct. 16, 2009 (r09289a)  
K-band  
NRAO150

# Imaging of KVN-VERA: Continuum source



KVN Yonsei, Ulsan - VERA 4 stations Q-band

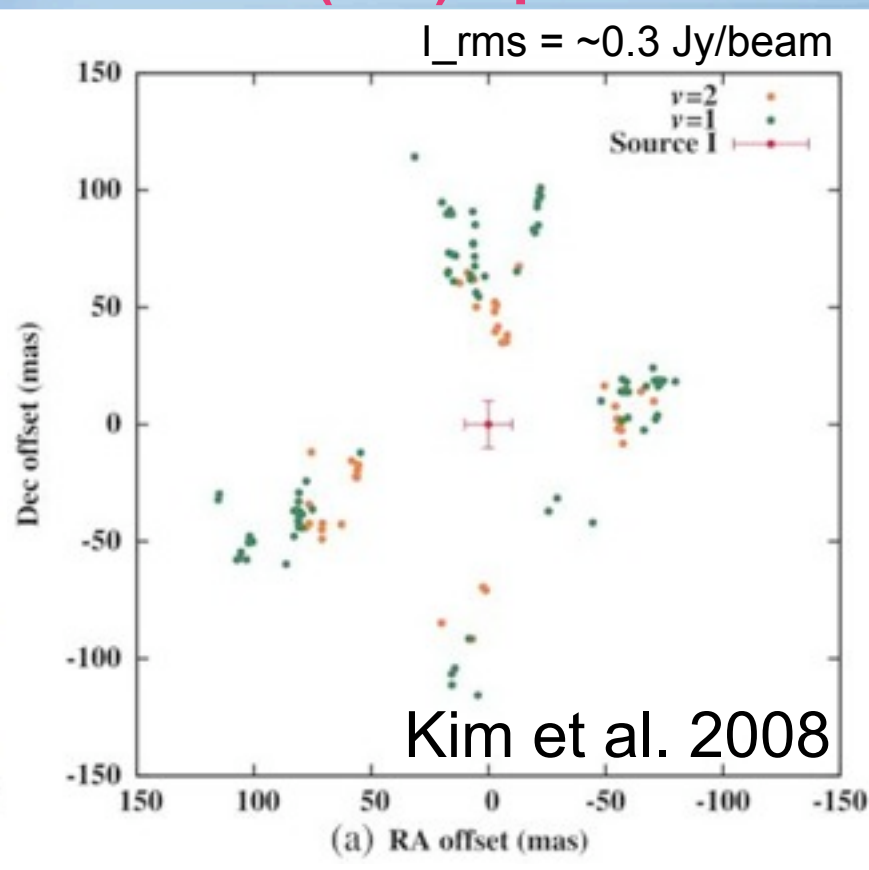
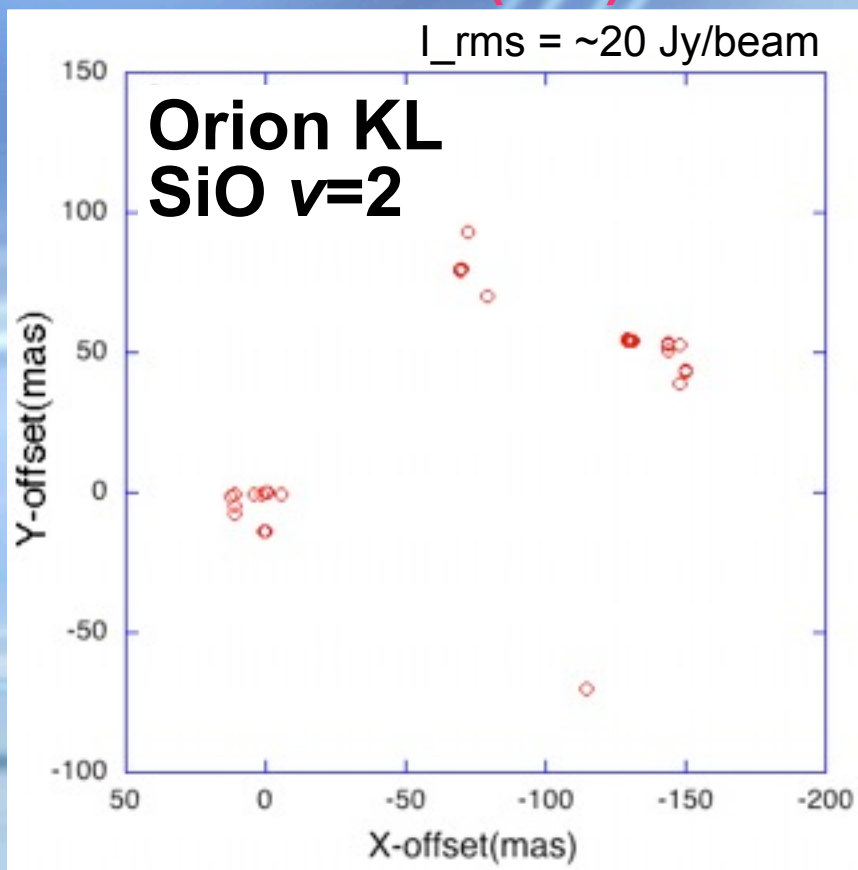
# Imaging of KVN-VERA: Maser source

SiO maser

Dec. 22, 2009

KVN+VERA (1hr)

VERA (8hr) : previous obs.



KVN Yonsei, Ulsan - VERA 4 stations Q-band

# China : Sheshan (Shanghai)

## Installation of K-4 terminal

- Feb. 2009

## Fringe detection in test observations

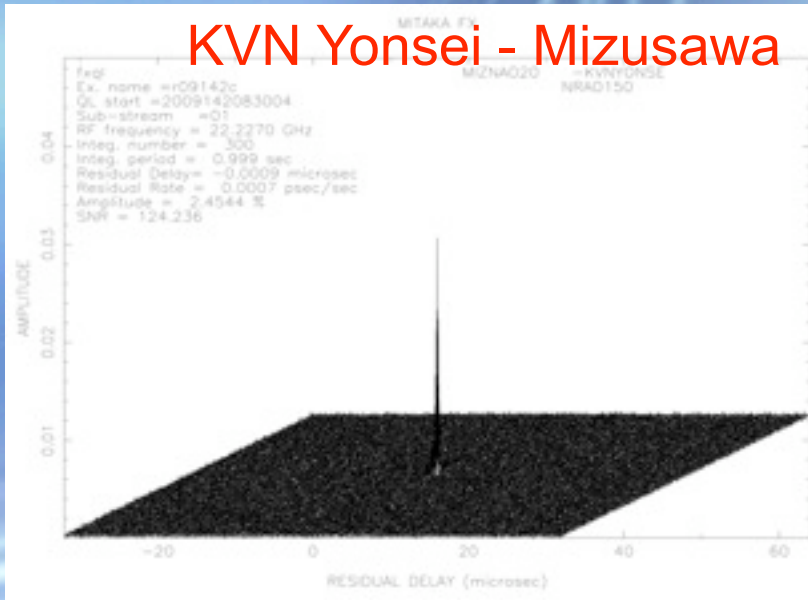
- 22 May 2009 (K-band)  
KVN Yonsei + Sheshan + VERA  
Shanghai-KVN-VERA (EAVN) first fringe detection
- 29 Nov. 2009 (X-band)  
Shanghai + JVN (VERA/Yamaguchi/Kashima)  
X-band fringe detection
- 28&29 Aug. 2010 (6.7GHz-band)  
Shanghai + JVN  
Scientific observation about methanol maser.  
Waiting for the correlation process.



Sheshan 25-m

# EAVN (China-Korea-Japan) K-band

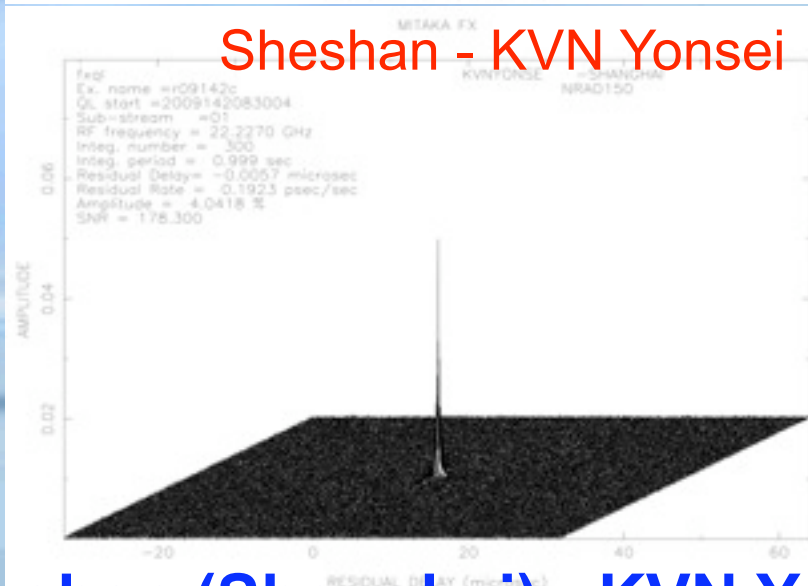
KVN Yonsei - Mizusawa



Sheshan - Mizusawa



Sheshan - KVN Yonsei



May 22, 2009  
NRAO150

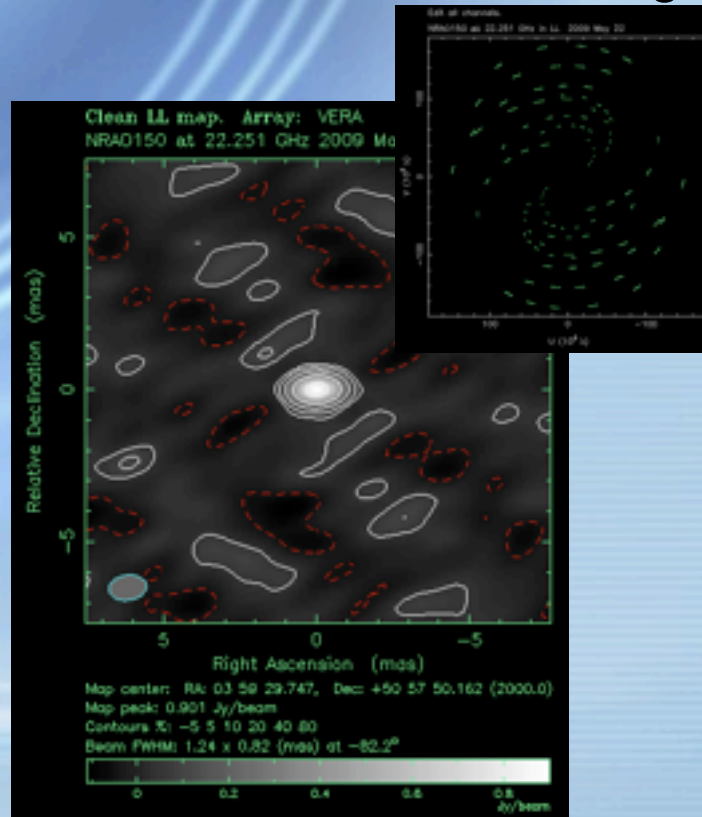
Sheshan (Shanghai) - KVN Yonsei (Seoul) - VERA K-band

# EAVN (China-Korea-Japan) K-band

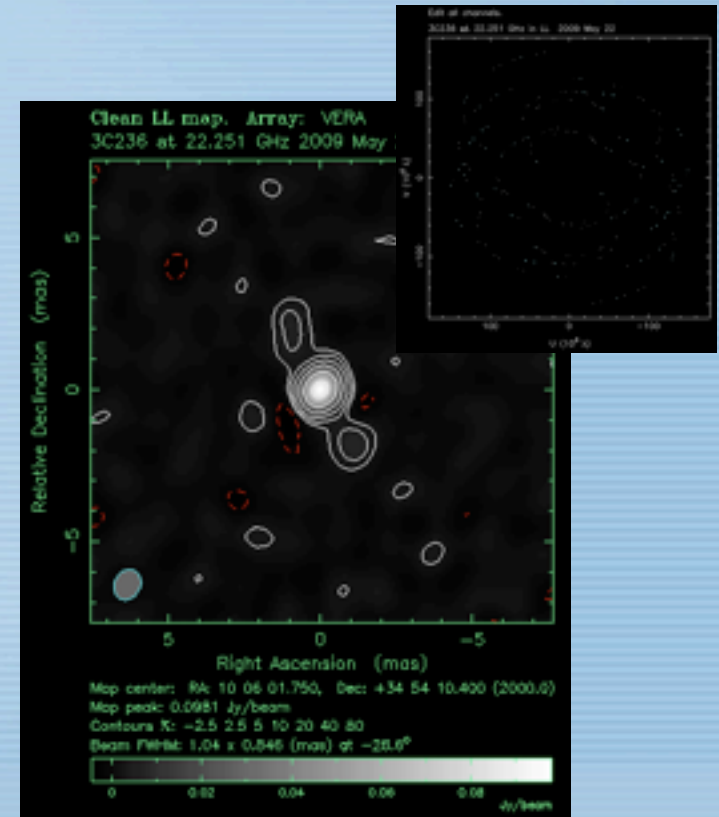
Preliminary maps

May 22, 2009

UV coverage



NRAO150



3C236

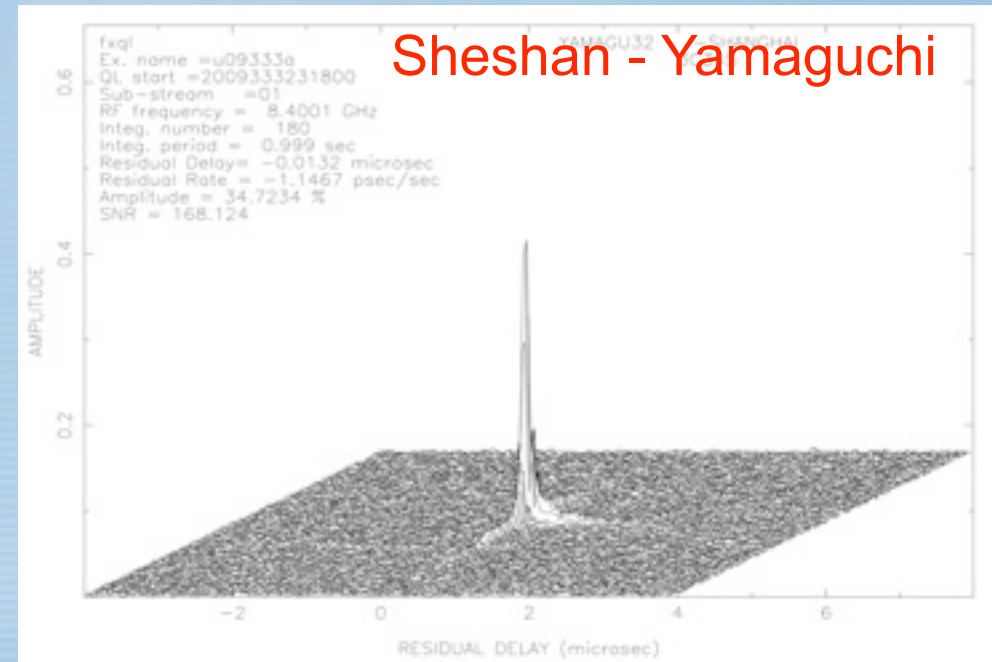
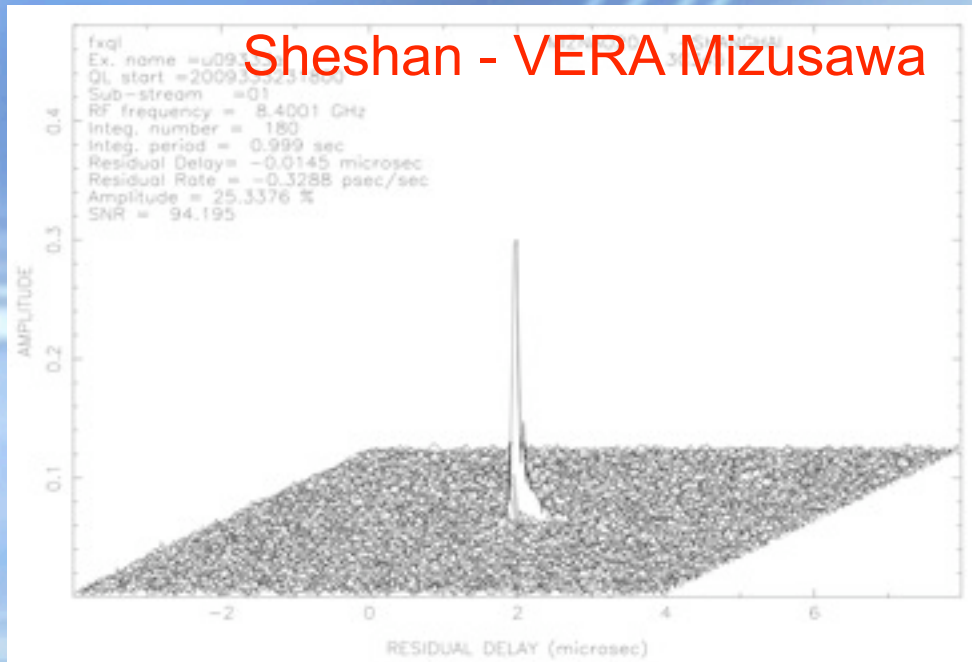
Sheshan (Shanghai) - KVN Yonsei (Seoul) - VERA K-band



# Shanghai-JVN X-band

Nov. 29, 2009

3C345



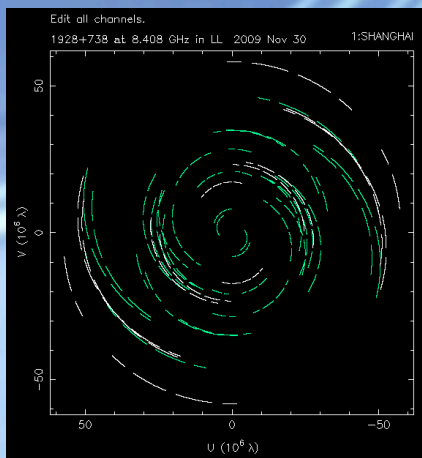
**Sheshan (Shanghai) - Yamaguchi - VERA Mizusawa X-band**

Sheshan - JVN(VERA, Yamaguchi 32-m, Kashima 34-m)

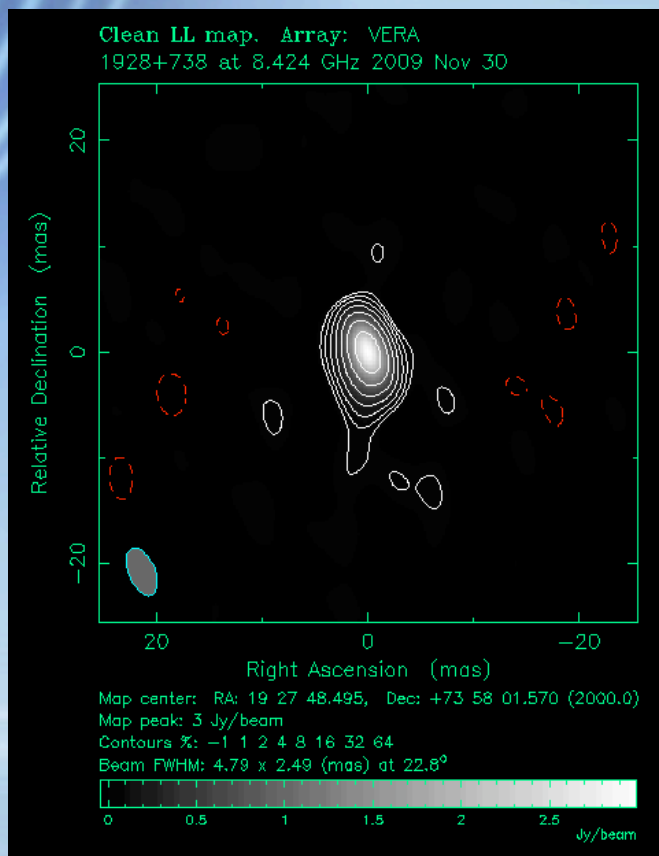
# Shanghai-JVN X-band

Imaging

1928+738

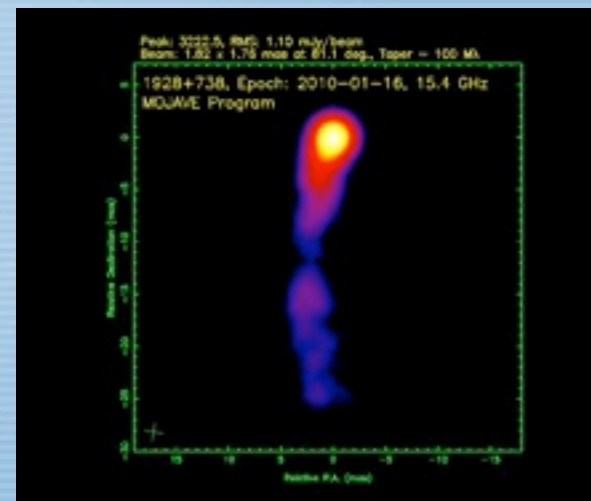


UV coverage



Clean map

VLBA 15GHz



Nov. 29, 2009

Sheshan-JVN(VERA, Yamaguchi 32-m, Kashima 34-m)

# Observing Frequency and Antennas

VERA		K4	Q-band (43GHz)	K-band (22GHz)	X-band (8GHz)	C-band (6.7GHz)
KVN	Yonsei	○	○ fringe detection (2009/03)	○ fringe detection (2008/11)	△ (in the future)	×
	Ulsan Tamna	○	○ fringe detection (2009/10)	○ fringe detection (2009/10)	△ (in the future)	×
CVN	Shanghai	○	×	○ fringe detection (2009/05)	○ fringe detection (2009/11)	○ Waiting for correlation (2010/08)
	other	×	×	Urumqi	Urumqi, Kunming, Beijing	×
JVN		○	Kashima, Nobeyama	Kashima, Gifu, Tomakomai, Tsukuba, (Yamaguchi, Ibaraki)	Yamaguchi, Usuda, Kashima, Tsukuba, Uchinoura, (Ibaraki)	Yamaguchi, Usuda, Ibaraki

# Present status

## Recently/Near future for KVN

- Terminal trouble in KVN

  - Ulsan DMS-24      Now cassette tapes are changed by hand.

  - Tamna DIR-1000      Spare recorder DIR-1000M in Feb 2010.

- KVN+VERA test observations every 1~2 months

  - Performance evaluation of KVN

    - Sensitivity check and Imaging test observations,
    - Geodesic observation to decide antenna position,
    - Phase reference observation, etc.

- System evaluation of KJJVC

  - Gbps recording for wideband observation and correlation process of Mark5B-DIR2000 using the KJJVC.

  - Gbps recording for KJJVC test

    - Parallel recording DIR-1000/DIR-2000 of VERA

# Present status

Recently/Near future for CVN

- Test observation with Shanghai

  - => Scientific observation

    - Methanol maser observations on the end of Aug. 2010

- Chinese second lunar satellite Chang'E-2 (嫦娥2号)

  - Not available over half - one year

- Extension to the other chinese antennas

  - Urumqi (<= very long baseline), Kunming, Beijing

    - X K4/VSOP terminal ?

  - Mark5B recording and correlation process by KJJVC

    - Mark5B was installed in each antenna of CVN.

    - Under investigation of data format in CVN

# Future

## Recently/Near future

- Regularly scientific observation  
among KVN, Shanghai, and JVN/VERA
- Key science / Project science for KVN+VERA array  
Korea-Japan joint science WG

## In the future

- Common Use observation as the East Asia VLBI Network
  - KVN+VERA
  - East Asia VLBI network (CVN+KVN+JVN/VERA)
- Ground-based telescope array for VSOP-2

# おしまい

## East Asia VLBI Network array configuration

