Status Report on KVN

The 5th Meeting of the EACOA

Hyun-Goo Kim / KASI

contents

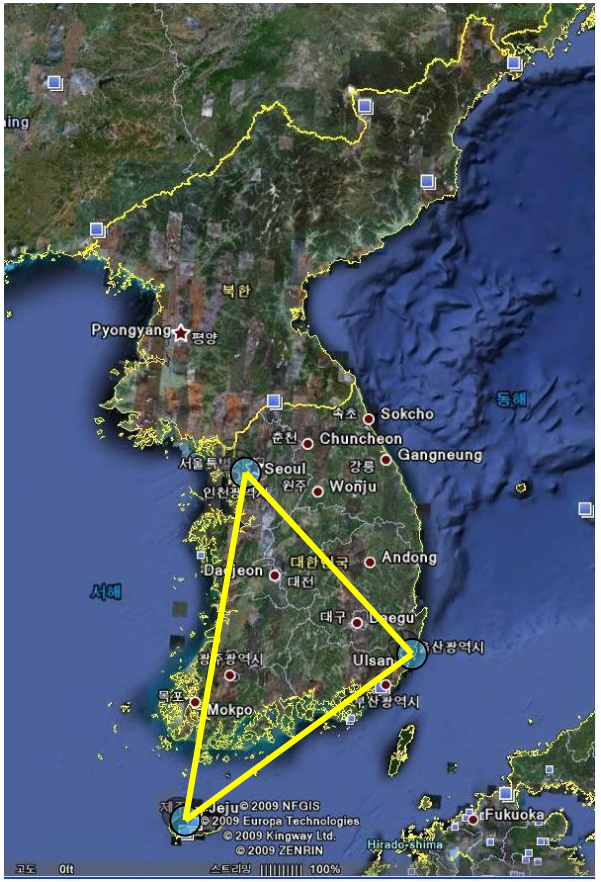
- Introduction
- Current Status of KVN
- Current Status of Correlator
- e-VLBI Test Observation
- Next Projects

Radio Astronomy Division

- Korean VLBI Network (KVN)
  - 3 sites : KVN Yonsei / Ulsan / Tamna
- Korea-Japan Correlator Center : Seoul
- Taeduk Radio Astronomy Observatory (TRAO) : Daejeon
- 2 Centers
  - Radio Astronomy Research Center
    - Calibration, Test Observations + Research
  - Radio Astronomy Project Center
    - Site Management + Correlator Development

KVN Telescopes

- 3 × 21m Antennas
- Maximum Baseline : 480 km
- 4 Channel (22/43/86/129 GHz)
- Simultaneous Observing System
- Multi-Channel Phase Correction

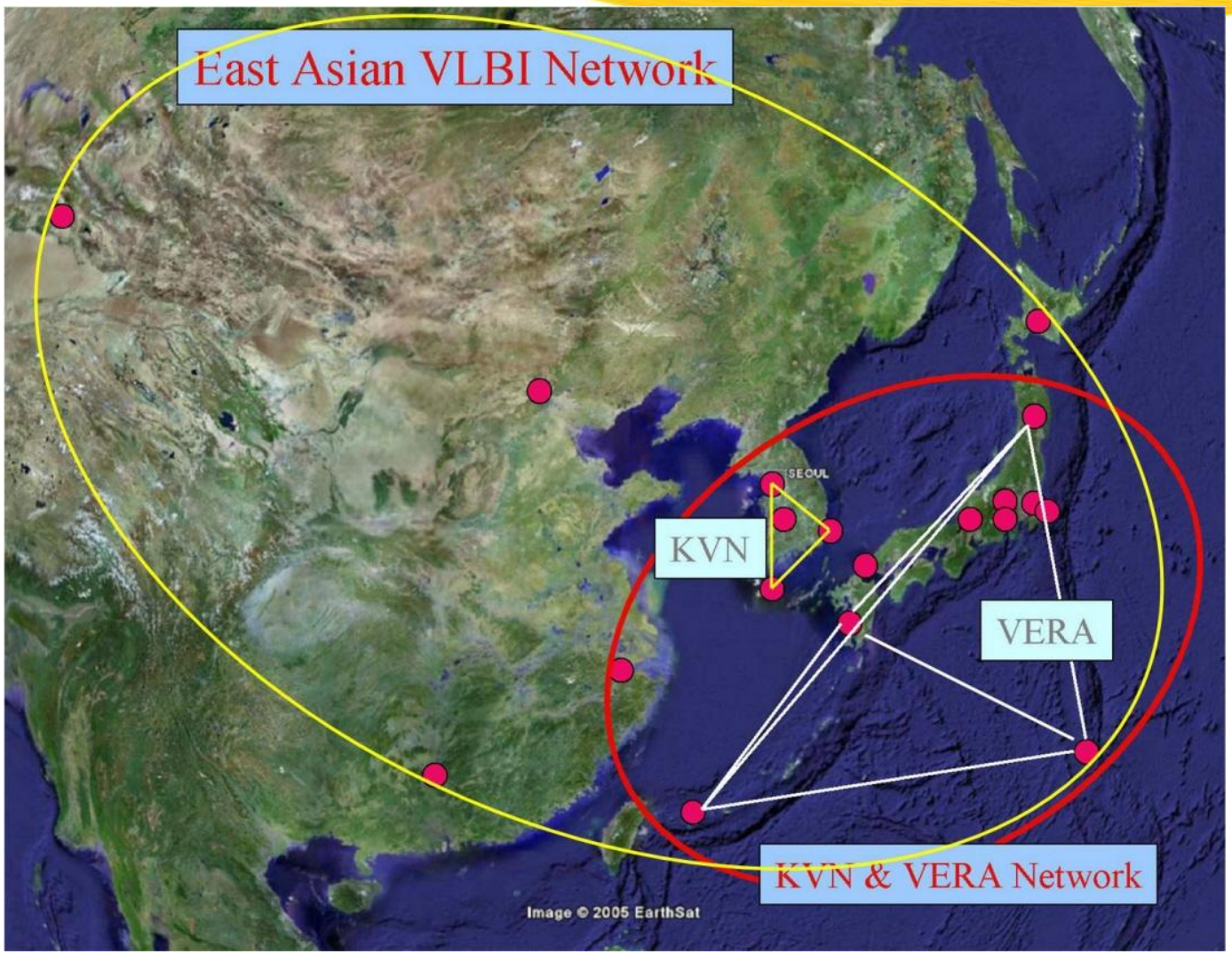


KVN Telescopes

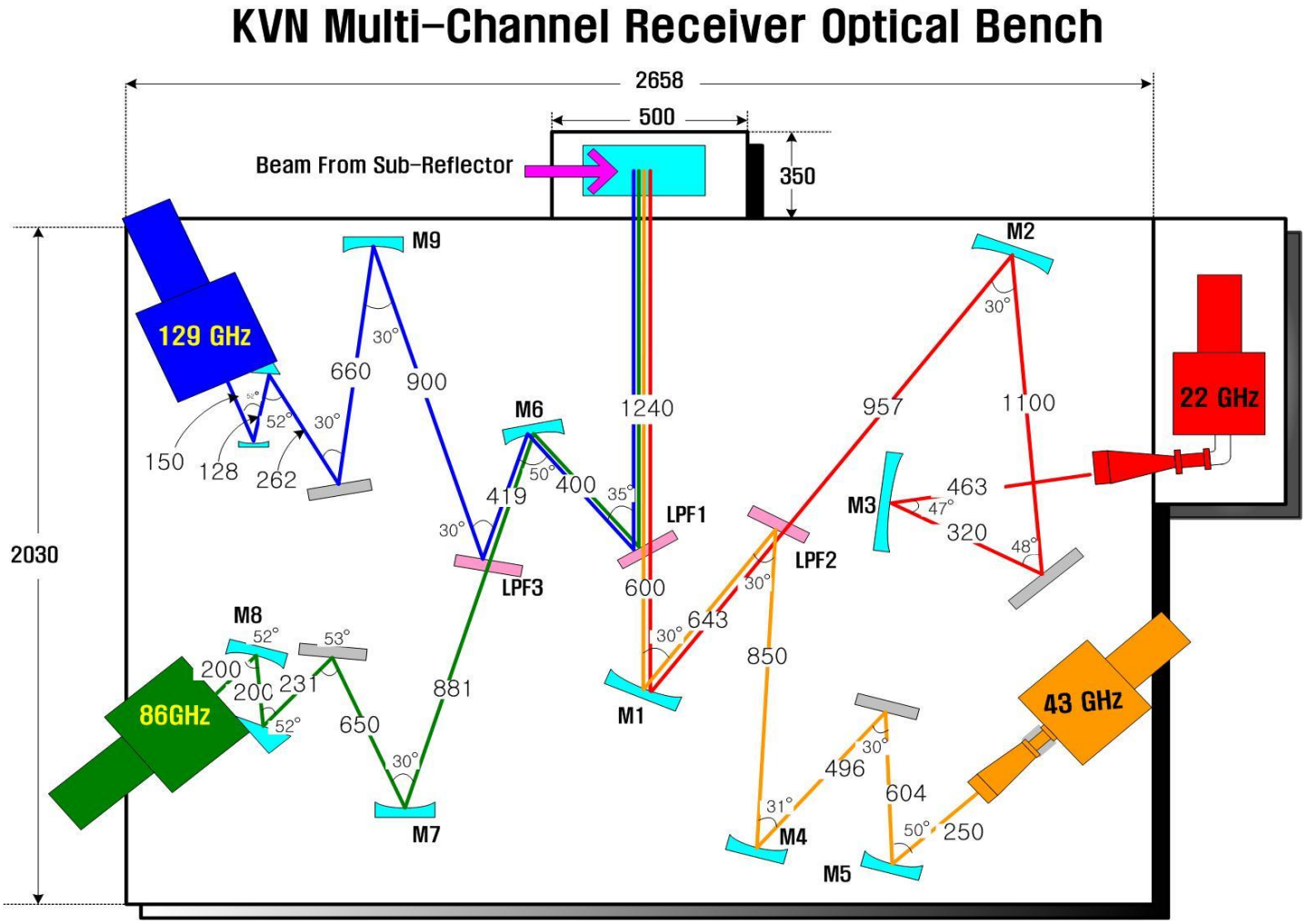
❖ Aperture Efficiency

	Telescope	Baseline	22 GHz	43 GHz	100 GHz
KVN	21m x 3	480 km	69%	72%	55%
VERA	20m x 4	2,300 km	50%	40%	-
VLBA	25m x 10	8,611 km	60%	51%	-
EAVN	19 @ 22GHz 9 @ 43GHz	5,000 km	-	-	-
VSOP2	-	30,000km	-	-	

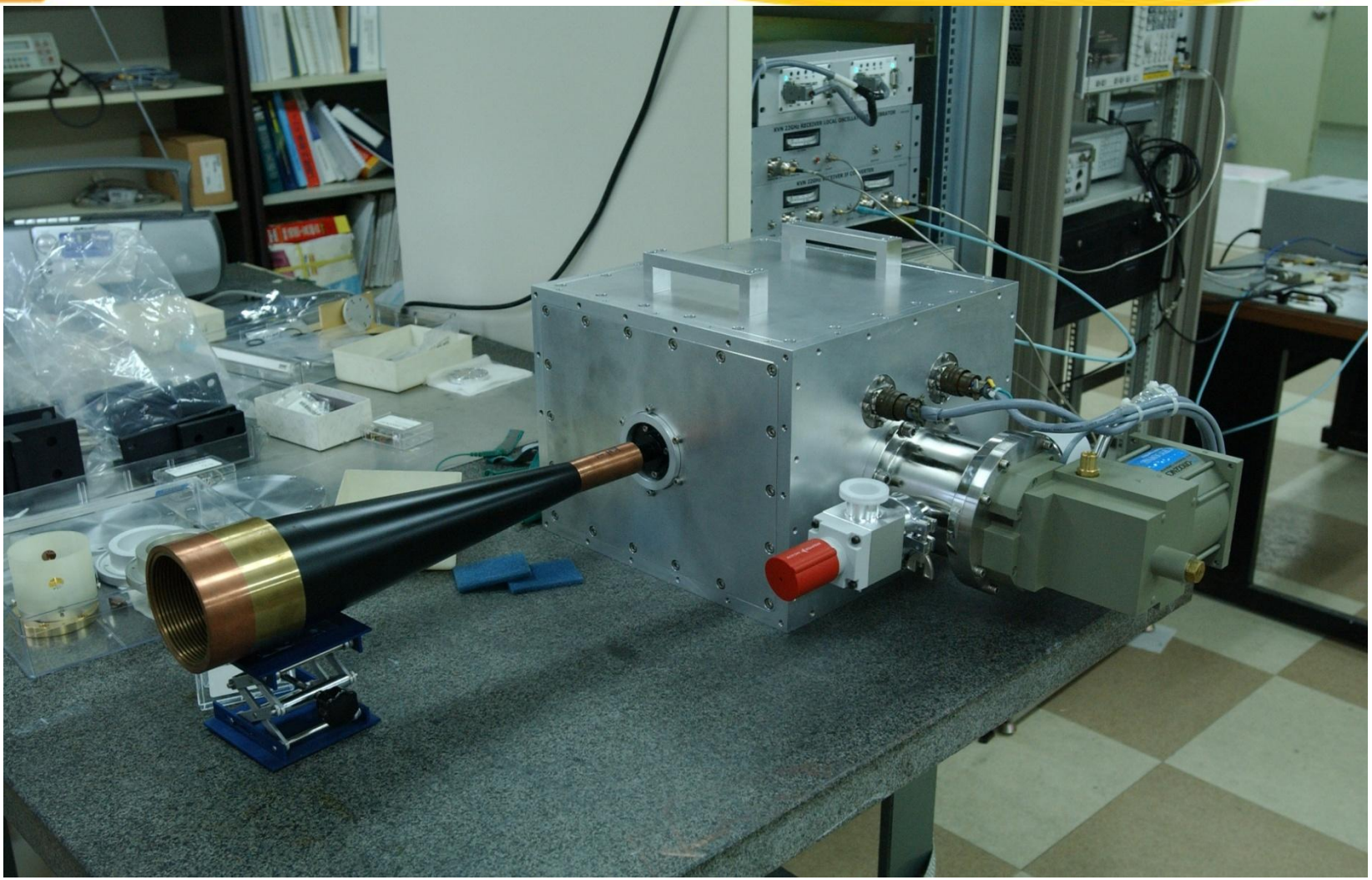
EAVN at 22GHz



KVN Receiver System

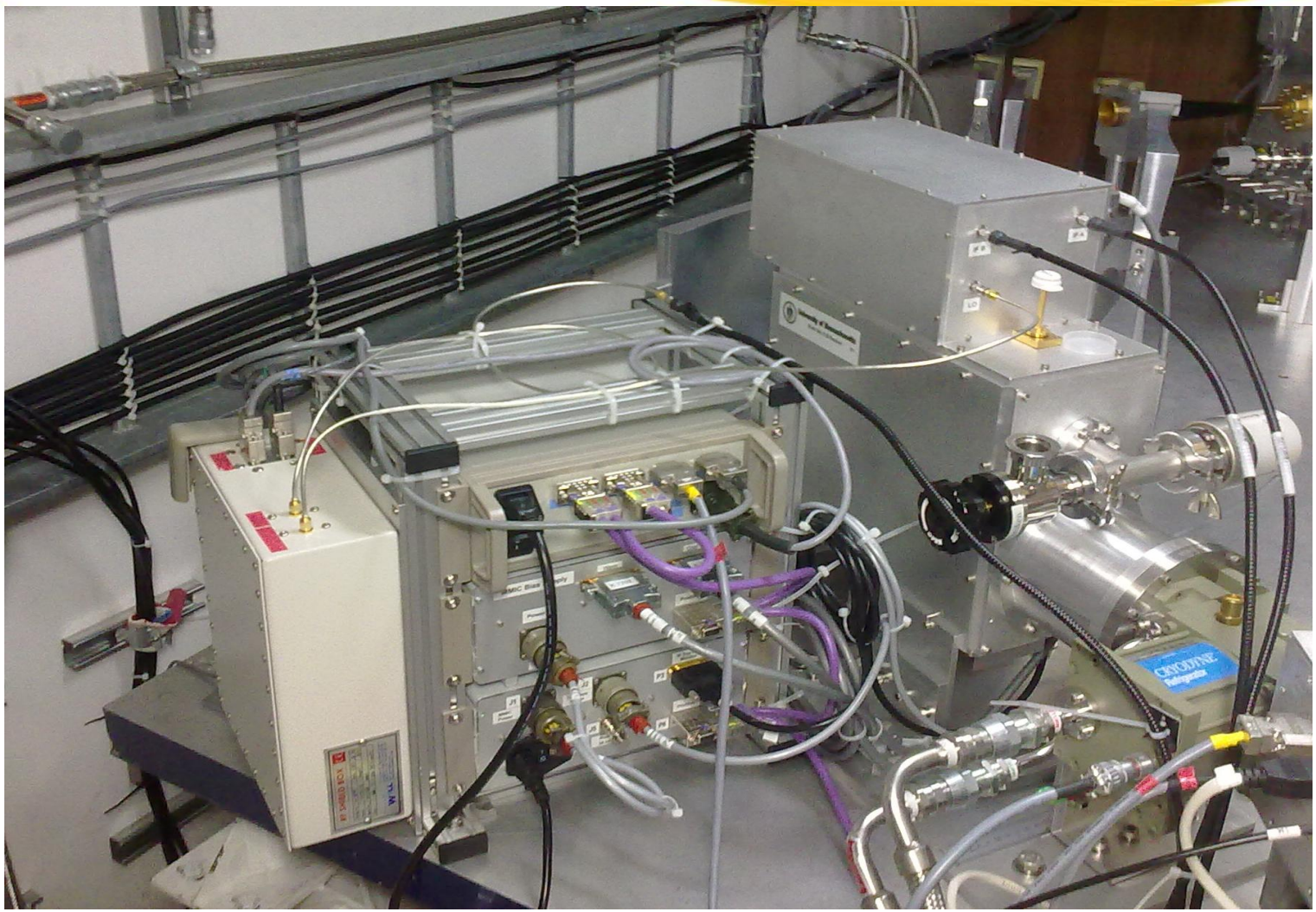


22GHz Receiver

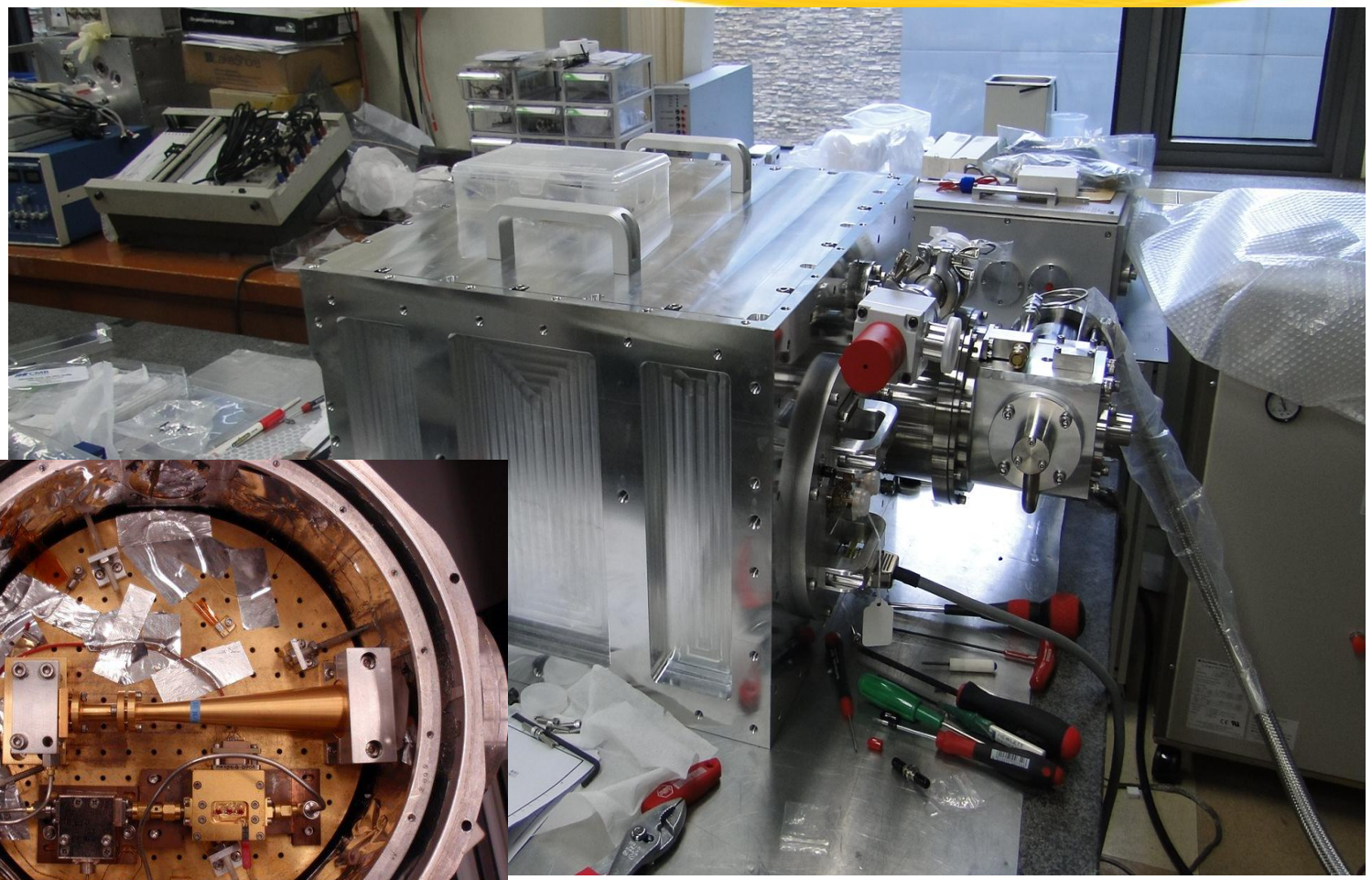


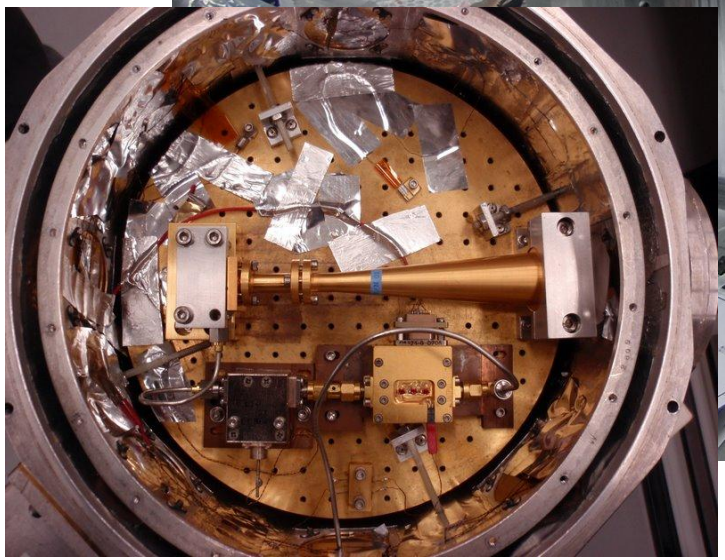
43GHz Receiver

86GHz Receiver

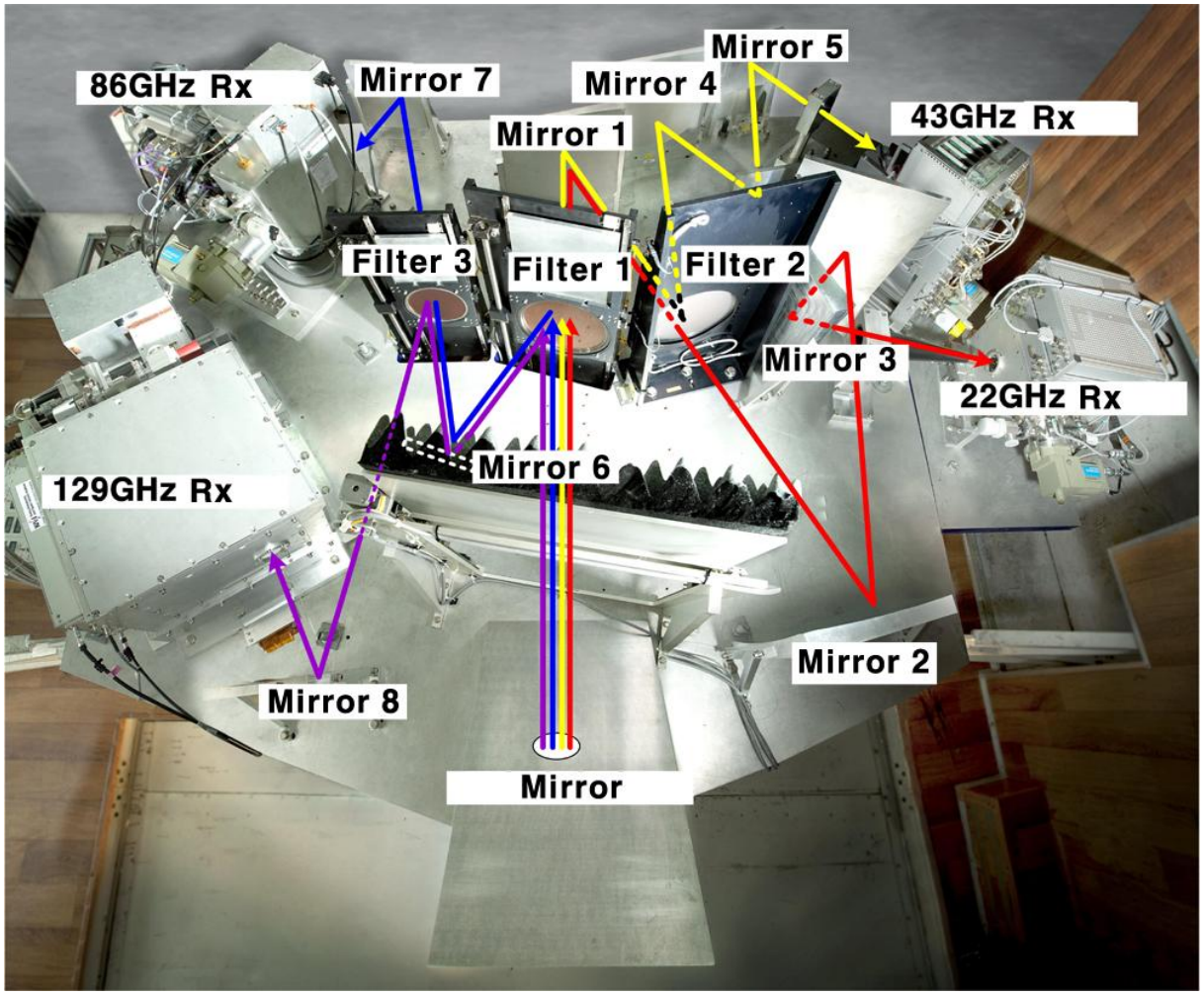


129GHz Receiver



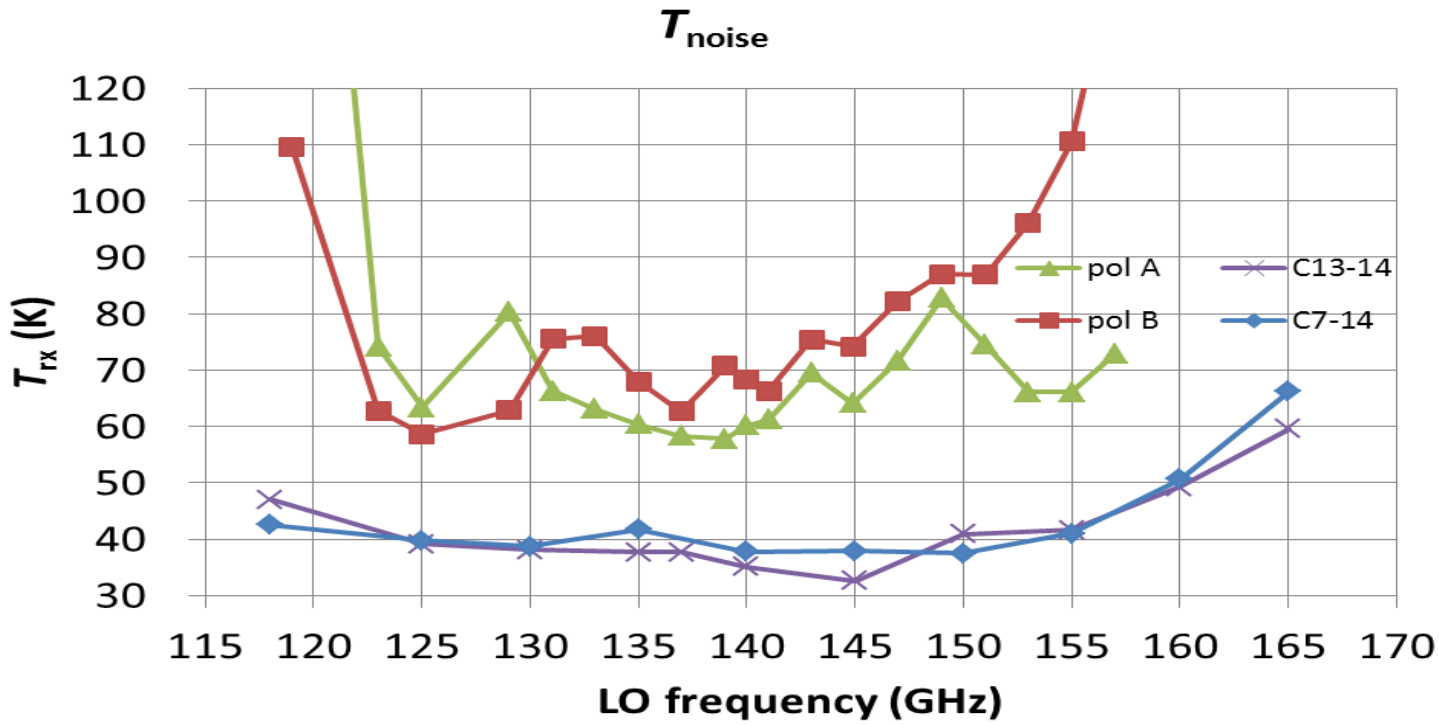


22/43/86/129 GHz Receivers



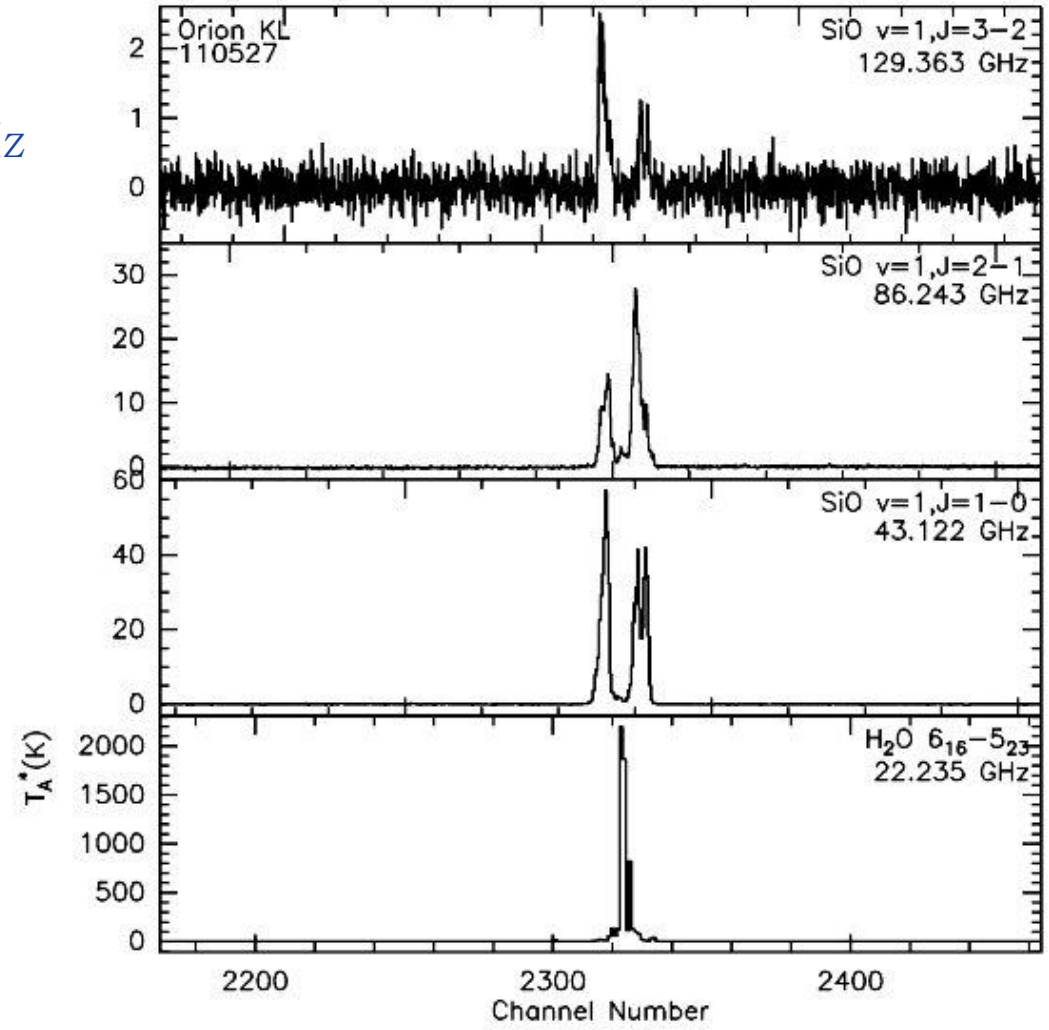
Receiver Temperature

Frequency	22 GHz (HEMT)	43 GHz (HEMT)	86 GHz (HEMT)	129 GHz (SIS)
Trx(SSB)	~40 K	~60 K	~70 K	~80 K



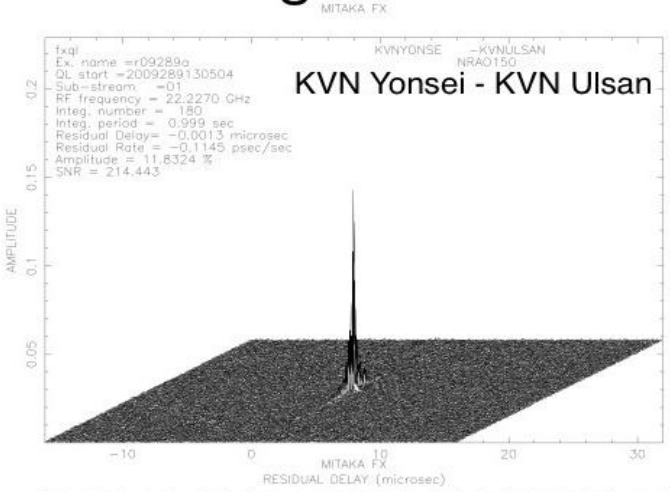
4 Channel Simultaneous Obs.

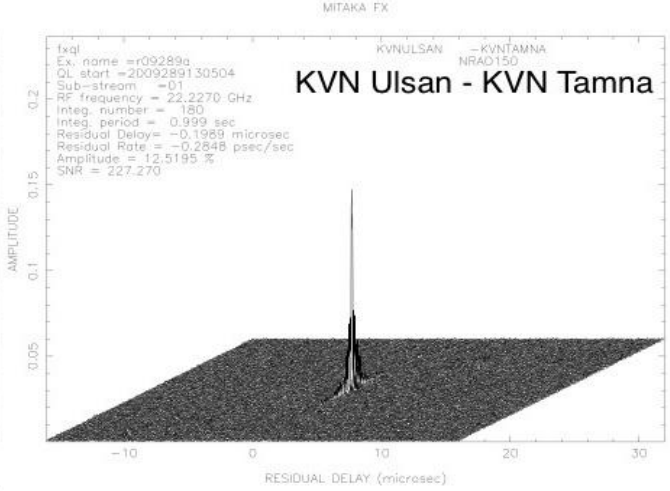
- 22/43/86/129 GHz toward Ori-KL
- Yonsei site (27 May, 2011)

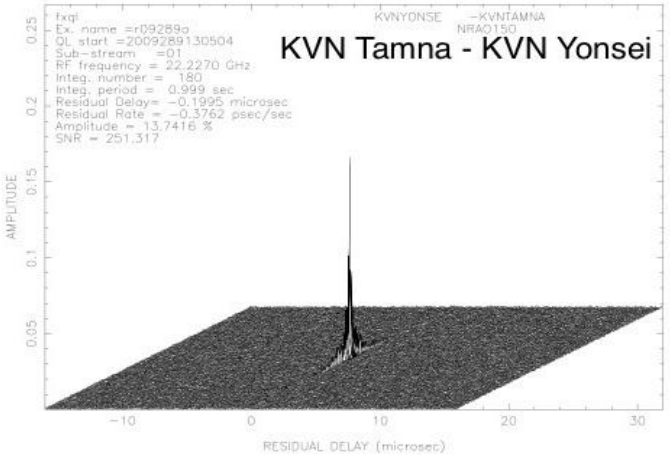


VLBI Test Obs.(22 GHz Cont.)

Fringes of KVN baselines in the K-band

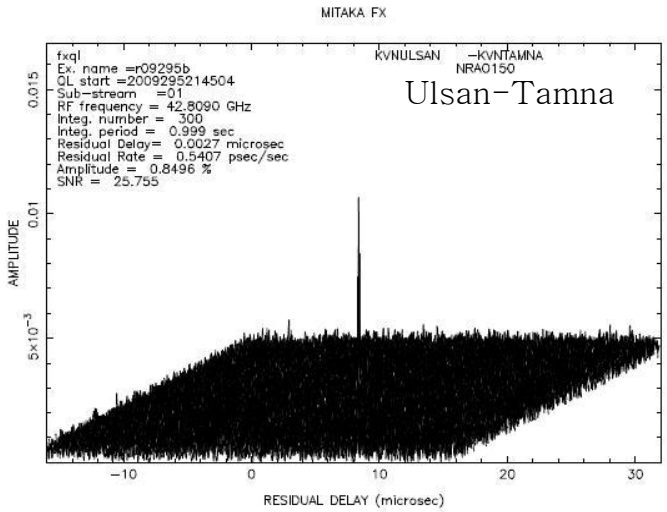


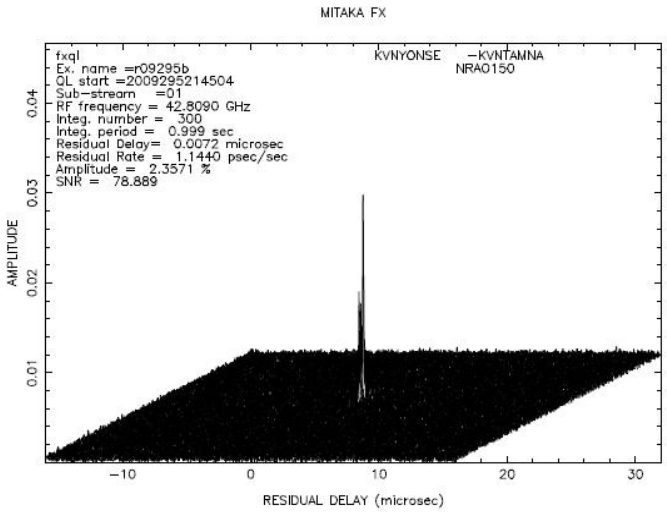


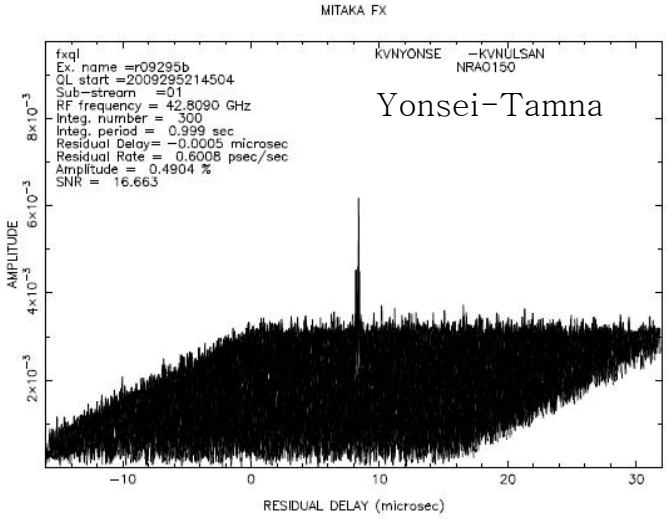


Oct. 16, 2009 (r09289a)
K-band
NRAO150

VLBI Test Obs.(43 GHz Cont.)

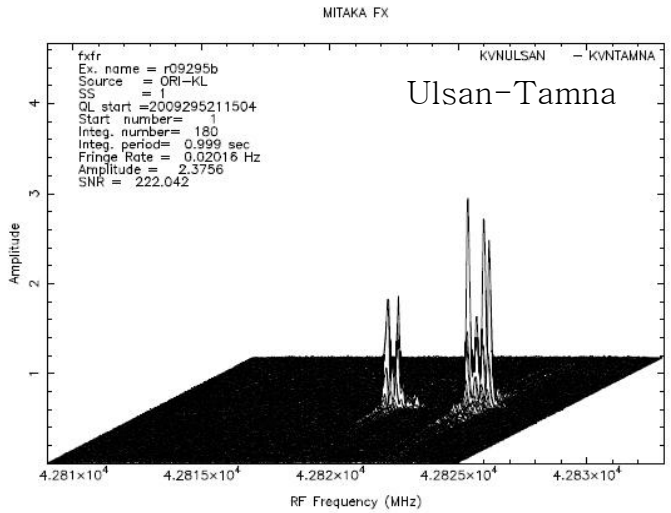


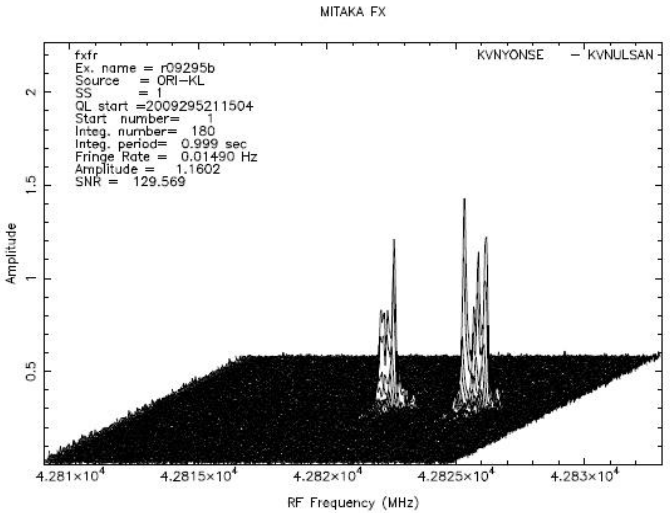


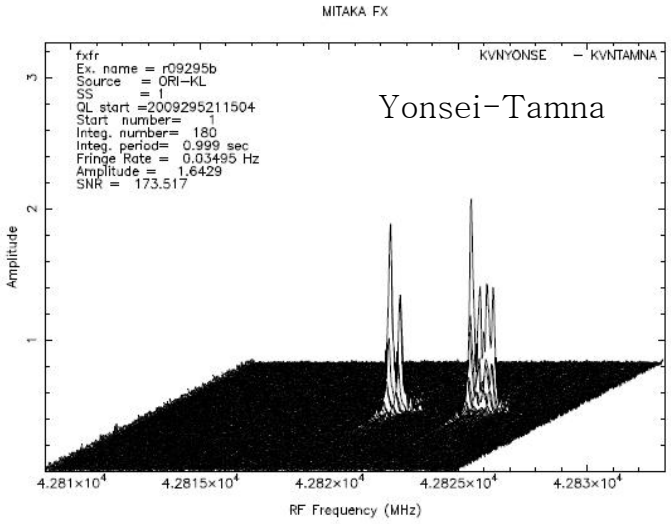


- Source : NRAO150
- Date : Oct. 22, 2009
- Freq. : 42.809 GHz
  (Continuum)

VLBI Test Obs.(43 GHz SiO Maser)







- Source : Ori-KL
- Date : Oct. 22, 2009
- Freq. : SiO Maser line

KVN – Recent Status

HW Installation

System		States
Telescopes		- Installed at all 3 sites in 2008
Rx	22/43 GHz	- Installed at all 3 sites in 2009
	86/129 GHz	- Installed at Yonsei(Seoul) in 2010 - Just installed at Ulsan(Ulsan) in 2011 - Will be installed at Tamna(Jeju) in 2012
Correlator		- Normal operation from 2012

KVN – Recent Status

Observational Status

Frequency		States
22/43 GHz	Single Dish	- Started from 2009 - Open to public from 2010
	VLBI (2ch)	- Test Observations from 2010 - Start from 2012 (with VERA)
86/129 GHz	Single Dish	- Test Started from 2011 - Research Observation from 2012
	VLBI (4ch)	- Test Observations in 2012 - Research Observation from 2013

KVN – Timeline

Scope of Work			2011	2012	2013
22/43 GHz	Single Dish	Test	finish		
		Research			
	VLBI (2ch)	Test			
		Research			
86/129 GHz	Single Dish	Test			
		Research			
	VLBI (4ch)	Test			
		Research			

Full VLBI operation will start from 2013

Current Status of Correlator

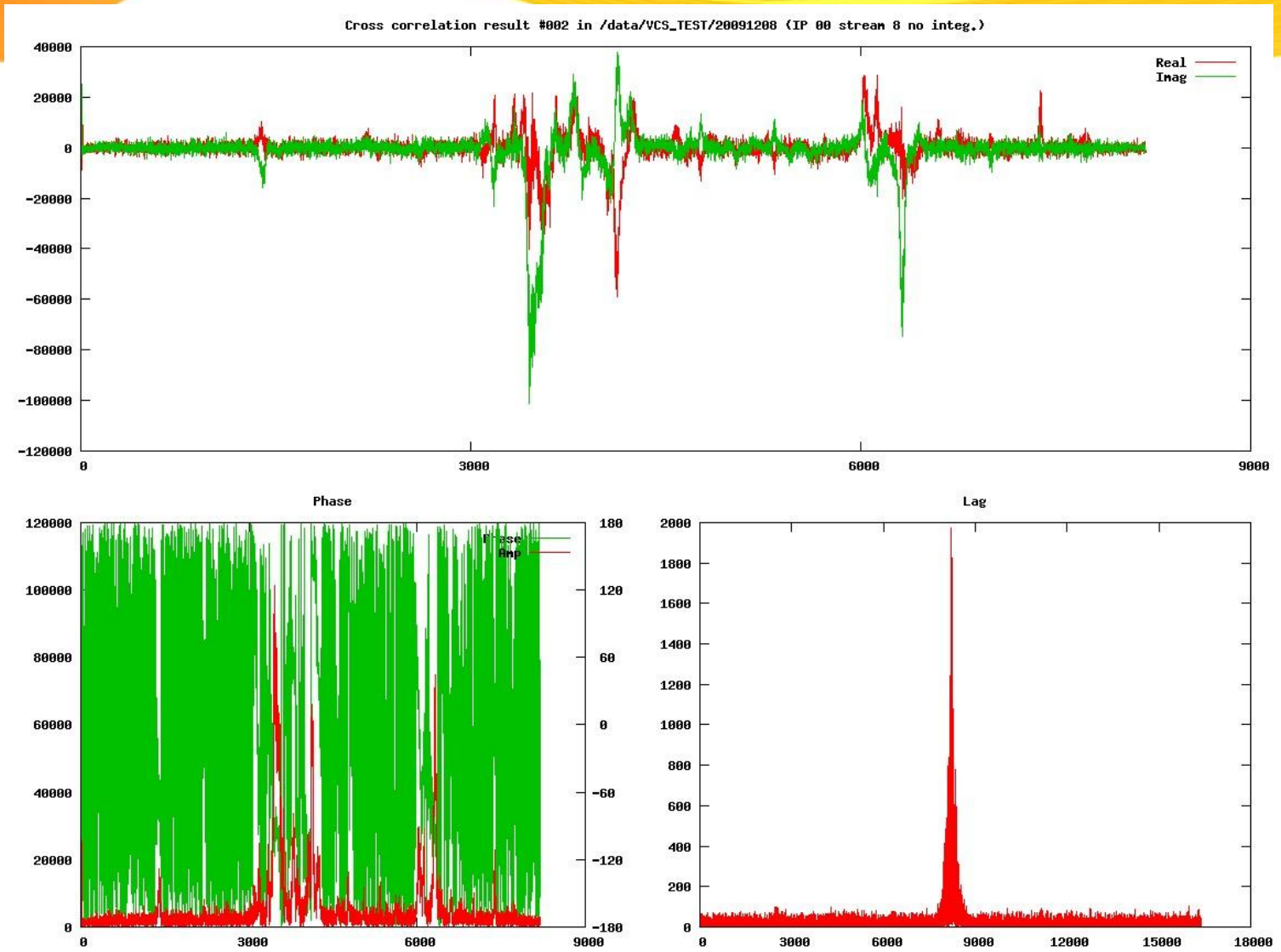
- **Korea-Japan Joint VLBI Correlator(KJJVC)**
  - Installation complete in 2011 at Seoul
  - Start operation from early 2012
  - will move to Daejeon in Oct. 2012
- **16 Recorders**
  (8 Mark5B, 4 VERA2000+DMS-24, 4 K5)
- **16 Raw VLBI Data Buffer(RVDB)**
- **Data Archive** : 100TB now, 1PB in near future
- **e-VLBI capability**

KJJVC(K-J Joint VLBI Correlator)

KJCC(K-J Correlation Center)

- 2010 : H/W installation
- KJCC Operation MoA (2011. 7.)
- 2012 : Normal operation

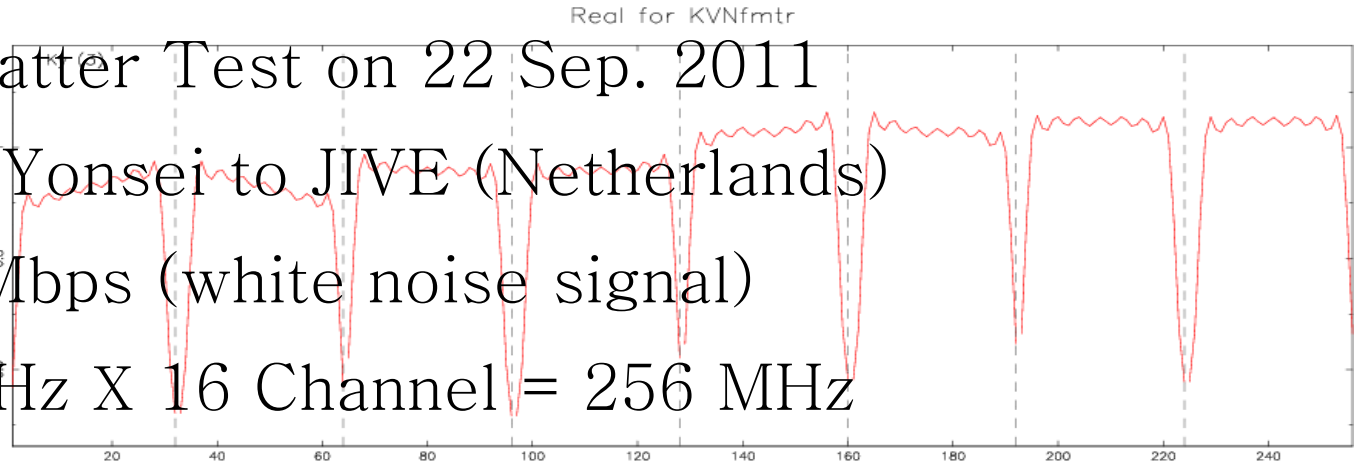
Cross-Corr(Yonsei-Ulsan W49N)



East-Asia VLBI Center

e-VLBI Test Observation

- Test run with VLBI schedule
  - Formatter Test on 22 Sep. 2011
  - KVN Yonsei to JIVE (Netherlands)
  - 512 Mbps (white noise signal)
  - 16 MHz X 16 Channel = 256 MHz
  - 8 ch X LCP, 8 ch X RCP
  - Stable Data Transfer & Compatibility



Autocorrelation data from Yonsei to JIVE (B. Campbell)

Channel

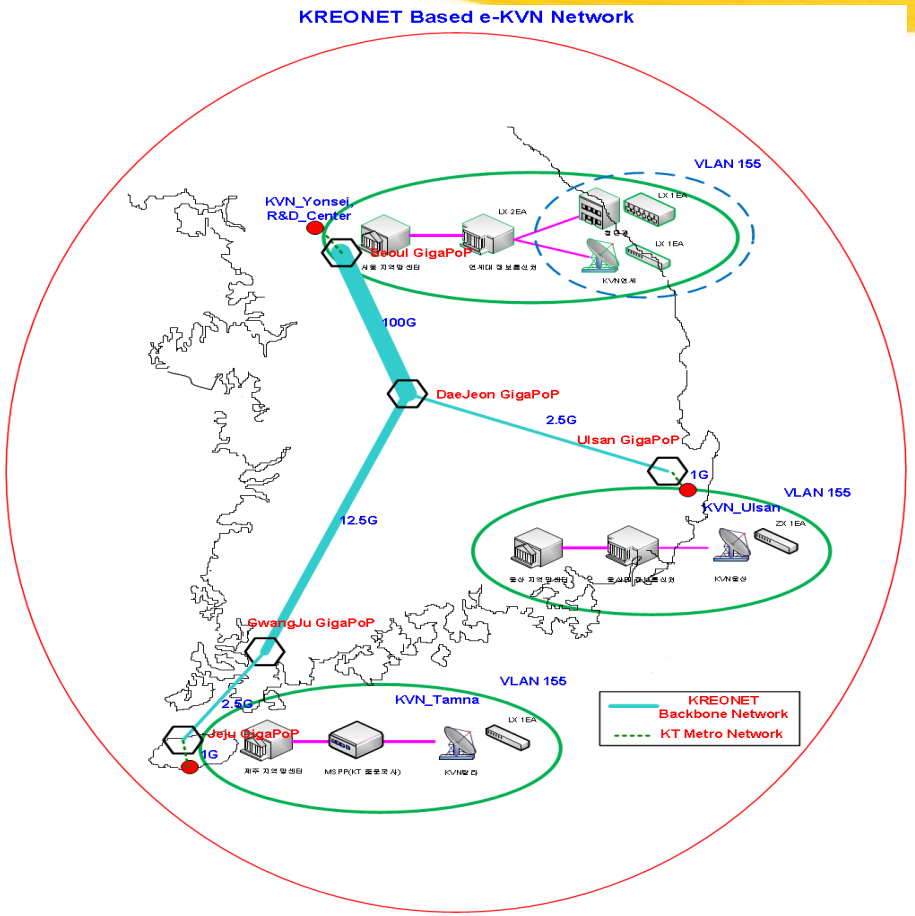
0/09:14:56 – 0/09:29:20

First e-VLBI Observation

- 19th Oct. 2011 UT 08-12
- 22GHz KVN-EVN e-VLBI observation
  - Succeed to get fringe @22GHz > 9200 km
- Telescopes joined
  - KVN Yonsei, Tamna
  - Yebes 40m (Spain)
  - Metsahovi 14m (Finland)

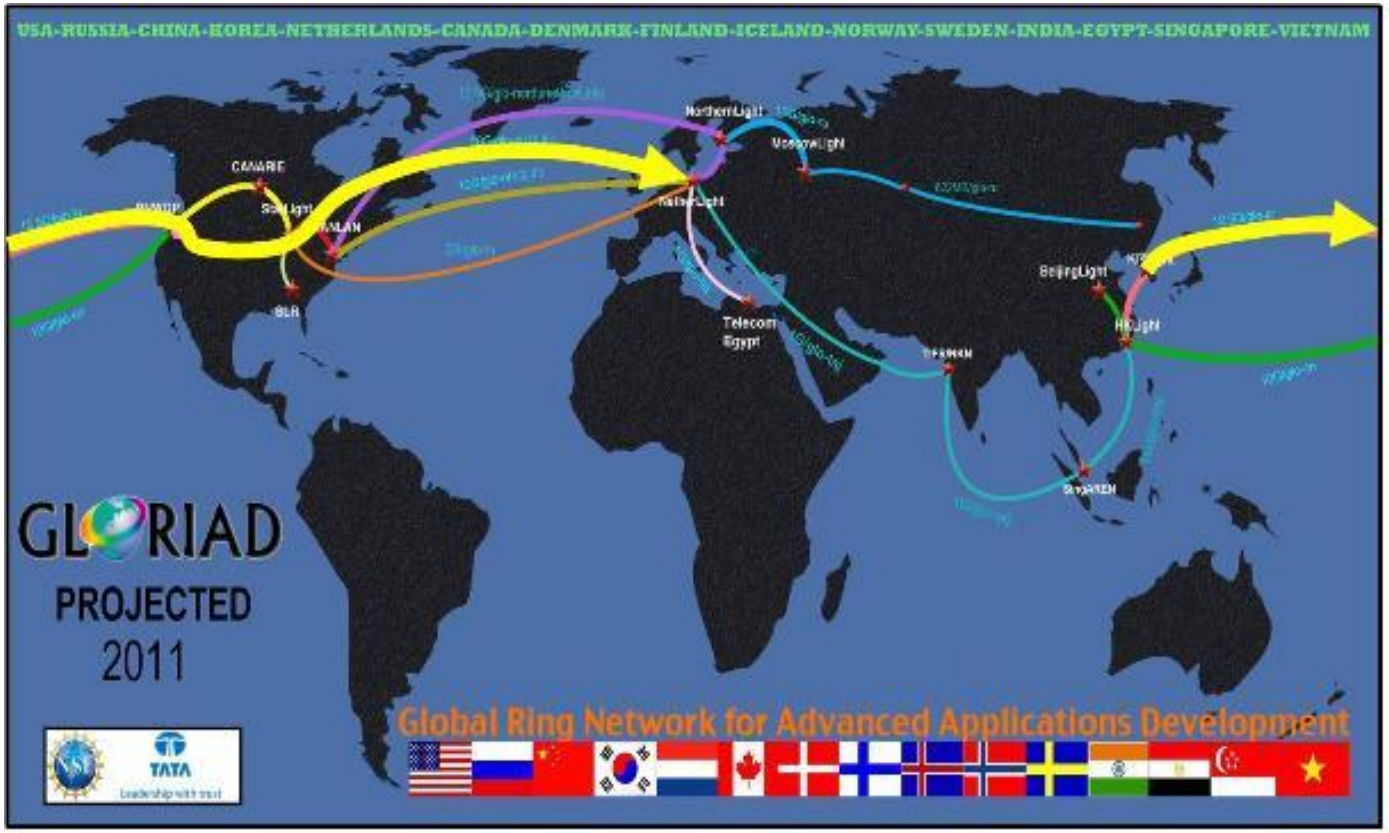



Domestic Network Path



✓ **Domestic : KREONET**
- Korea Research Environment Open Network

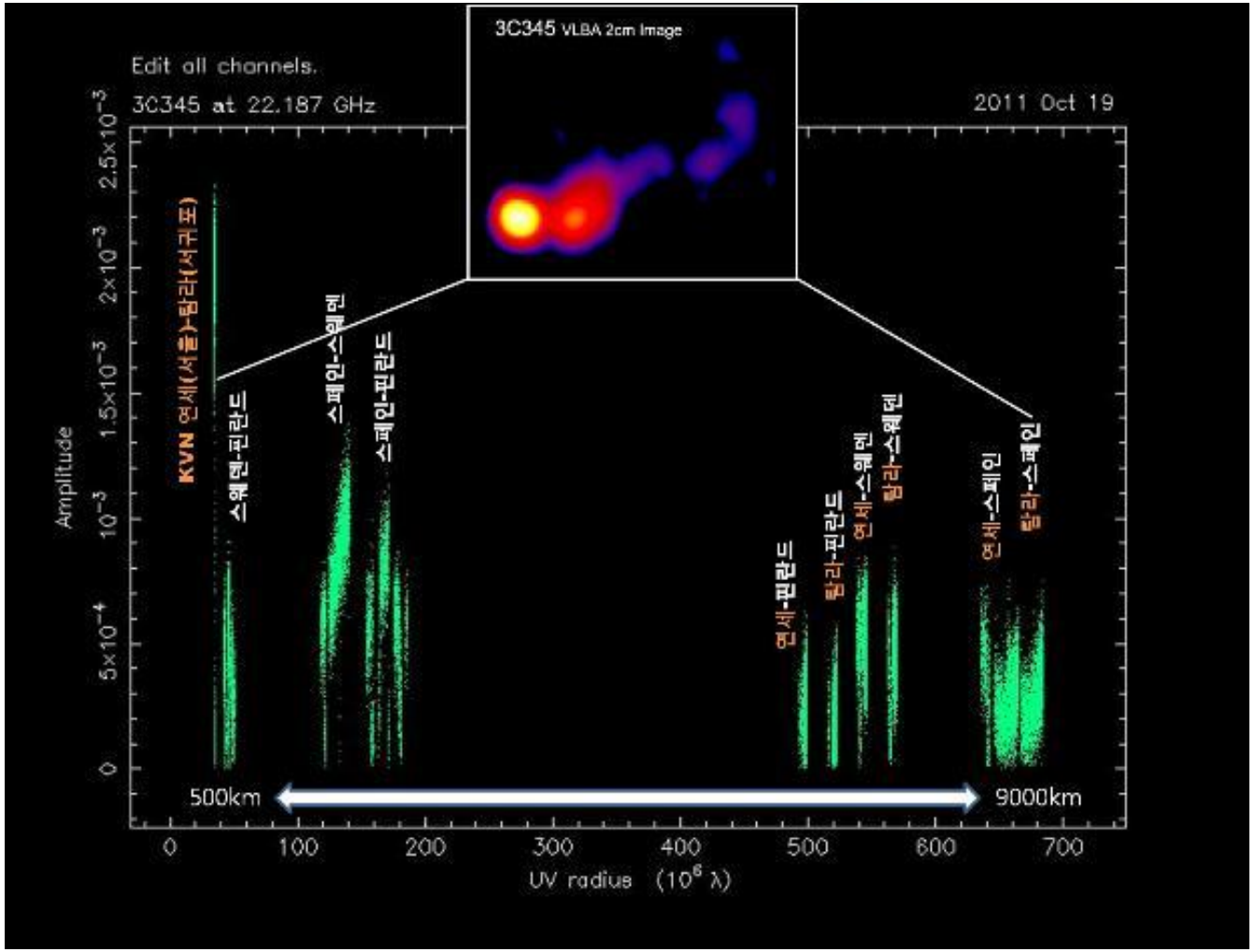
International Network Path



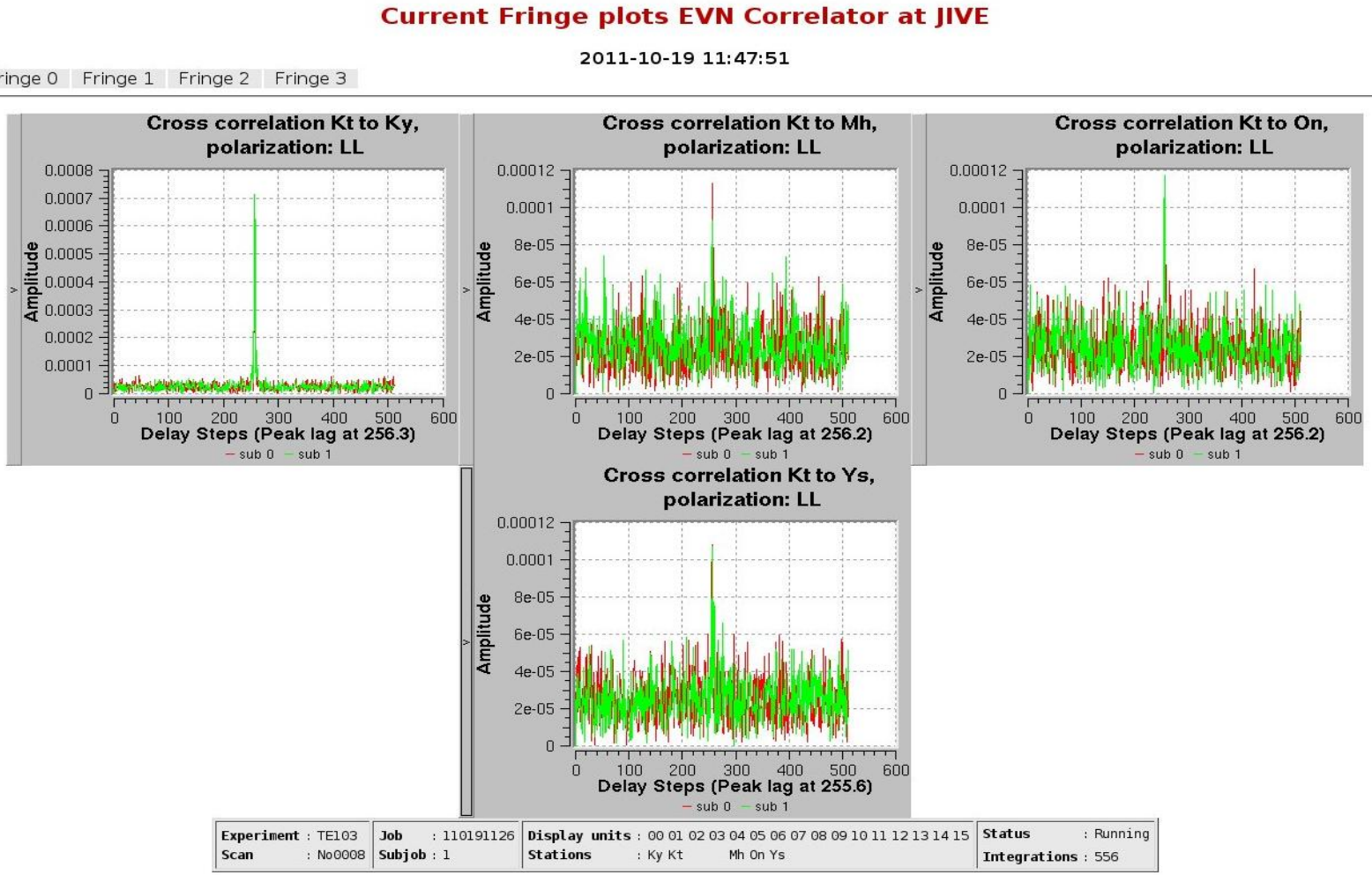
✓ **International : GLORIAD**

- Global Ring Network for Advanced Application Development

e-VLBI Result



e-VLBI Result



Next Projects in Korea

- ALMA
  - Many astronomers wish to join
  - KASI is interested in joining
  - Investment schedule and level (?)
    (need more discussion)

- SKA
  - Possible future project
  - Korea : Observer
  - Government have not accepted

Thank you
for your attention!