

# 東アジアVLBI観測網

小林秀行(国立天文台水沢VERA観測所)

2008.10.10

# East Asia VLBI Network

- Preparation Committee was organized at Shanghai mm-VLBI meeting on Oct. 2003.
- East Asia VLBI consortium committee was organized at the EAMA6 meeting on Oct. 2004.

# Current working VLBI stations

- Japan(13)

- VERA(4), Kashima, Tsukuba, Yamaguchi, Nobeyama, Usuda, Uchinoura, Tomakomai, Gifu, Takahagi

- Korea(3)

- KVN (3)

- China(4)

- Shanghai, Urumqi, Beijing, Kunming

# 観測局数

- 43GHz (8局)
  - KVN21mx3、VERA20mx4、野辺山45m
- 22GHz (15局)
  - 鹿島34m、高萩32m、筑波32m、山口32m、上海25m、ウルムチ25m、KVN21mx3、VERA20mx4、苫小牧11m、岐阜11m、(野辺山45m)
- 8GHz (13局)
  - 臼田64m、北京50m、昆明45m、鹿島34m、内之浦34m、高萩32m、筑波32m、山口32m、上海25m、ウルムチ25m、KVN21mx3
- 6.7GHz (9局)
  - 臼田64m、内之浦34m、高萩32m、山口32m、上海25m、VERA20mx4

# East Asia VLBI Network array





# East Asia VLBI Network array 43GHz





# East Asia VLBI Network array 22GHz





# East Asia VLBI Network array 8GHz





# East Asia VLBI Network array 6.7GHz



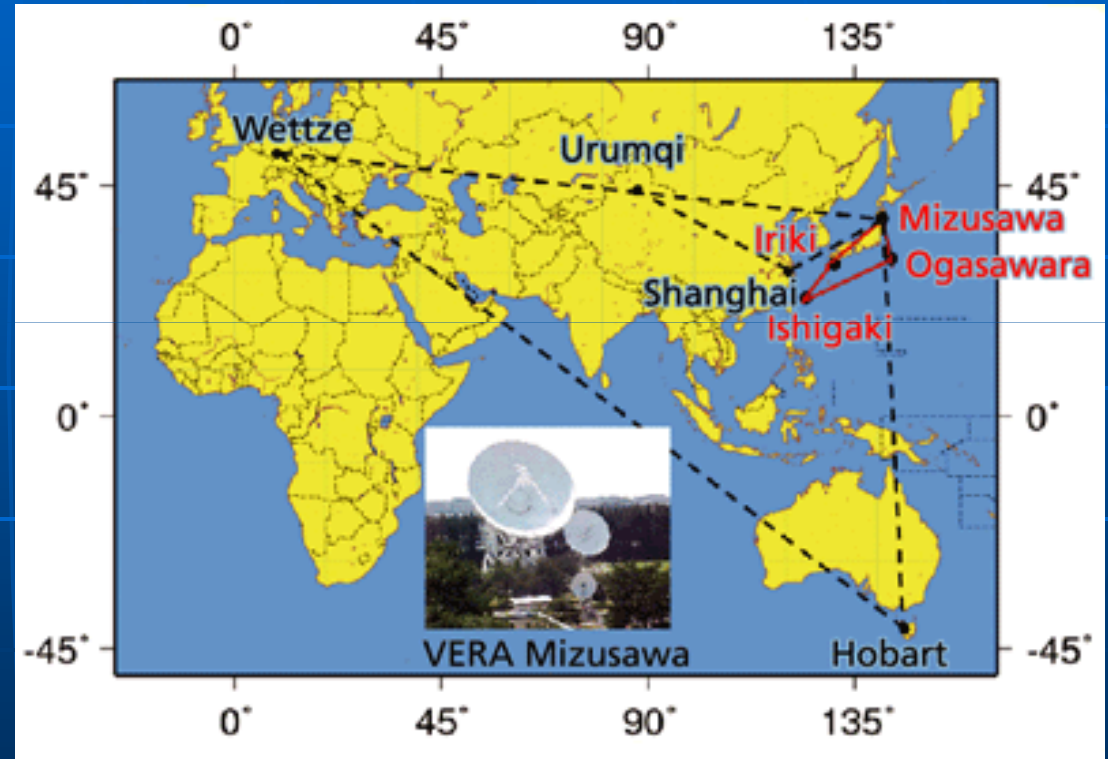
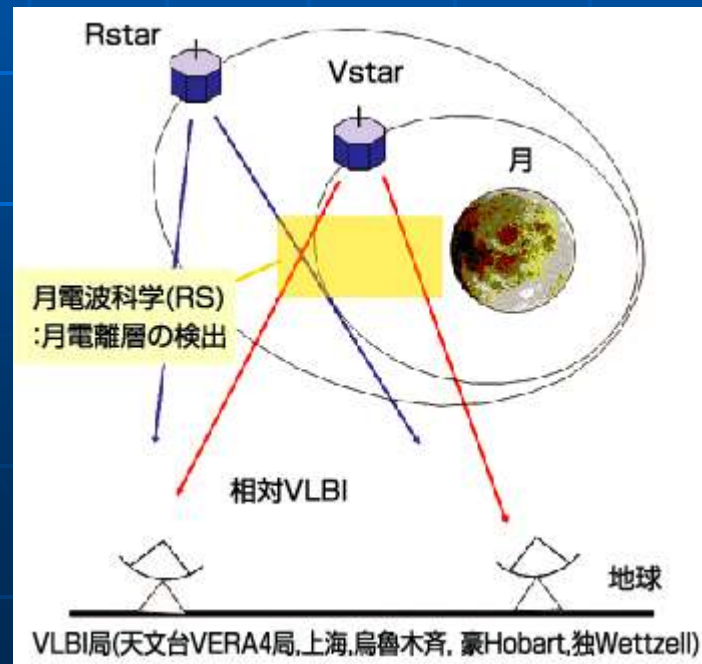
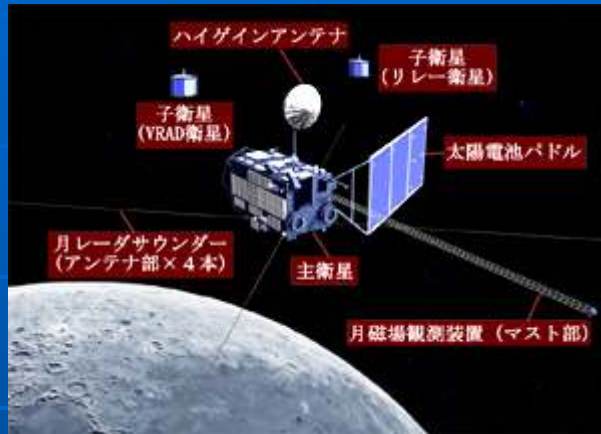
East Asia VLBI consortium  
(under East Asia Core  
Observatory Association)  
~2004

Japanese VLBI network  
Including VERA

Korean VLBI network

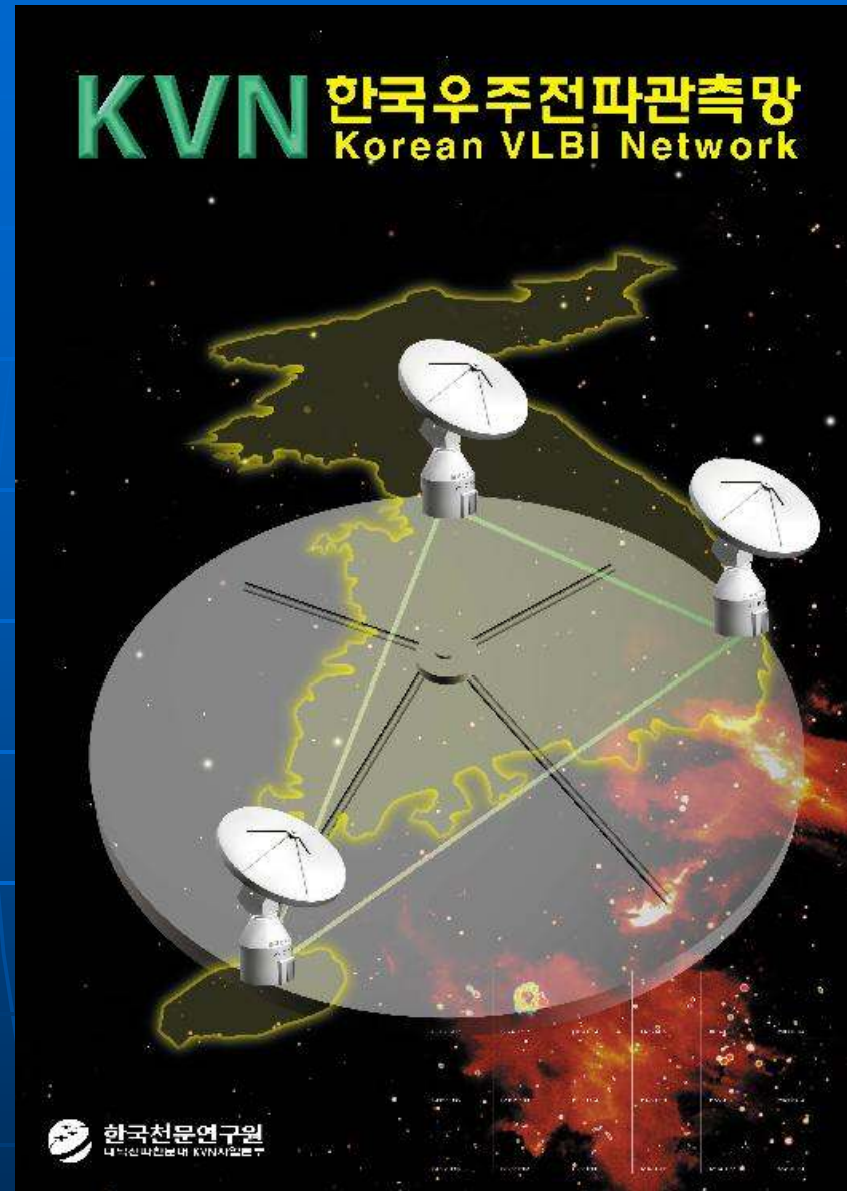
Chinese VLBI  
network

# Kaguya (RISE) mission



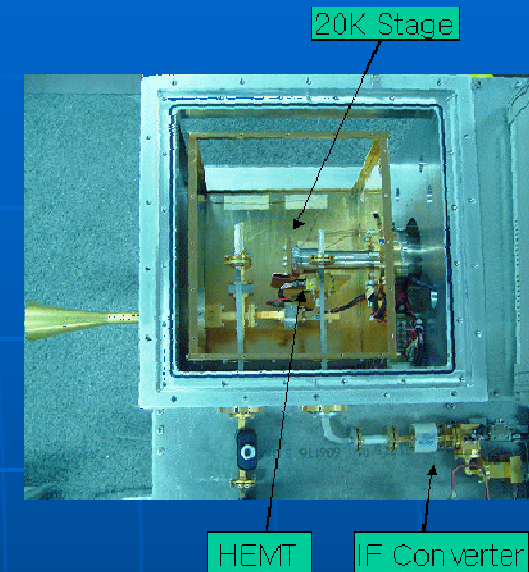
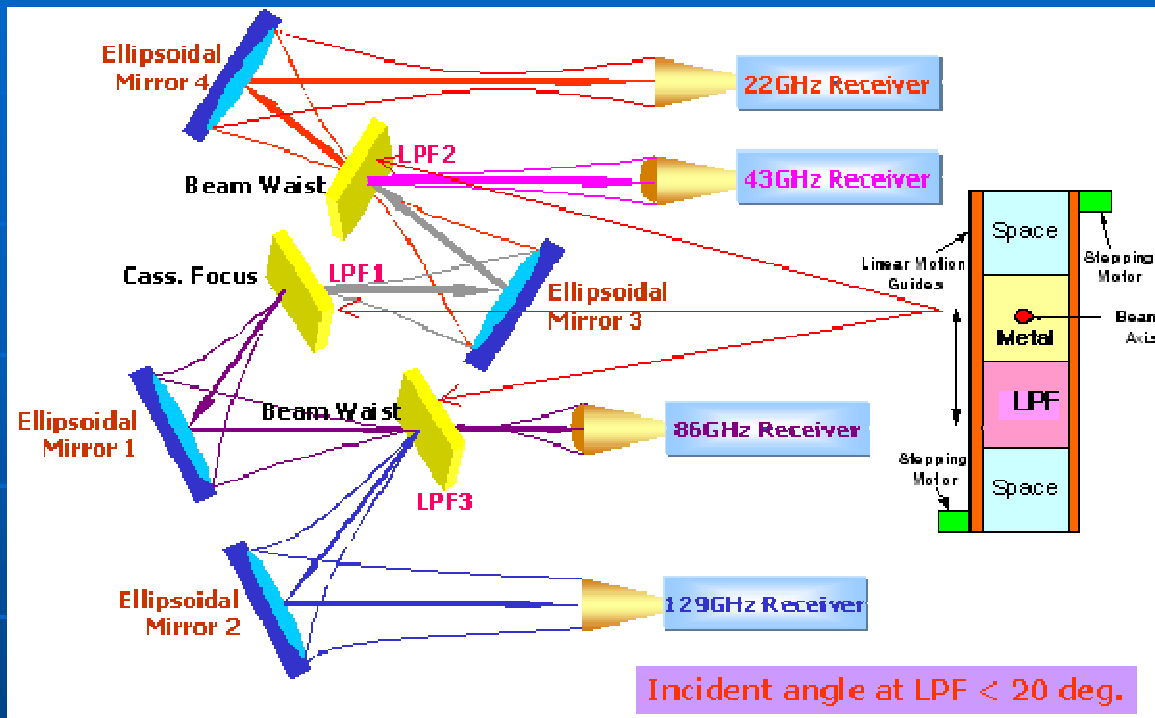


**KVN 한국우주전파관측망**  
Korean VLBI Network



Simultaneous Multi-Frequency Obs. -  
Phase Compensation, mm-VLBI

# Receiver



Prototype 43 GHz Receiver

Freq. Band	S Band	X Band	K Band	Q Band
Freq. Range	2.2 ~ 2.8 GHz	8 ~ 9 GHz	21.5 ~ 23.5 GHz	42 ~ 44 GHz
Rx Noise	< 25 K	< 25 K	< 30 K	< 50 K
1 <sup>st</sup> IF / BW	2.5G/600MHz	8.5G/1GHz	8.5G/2GHz	8.5G/2GHz
IF Power	-20 dBm	-20 dBm	-20 dBm	-20 dBm
Polarization	LCP/RCP	LCP/RCP	LCP/RCP	LCP/RCP

**\* 86, 129 GHz Receivers will be installed within 2010.**

# Chinese VLBI Network

1993 (25m)



1987  
(25m)



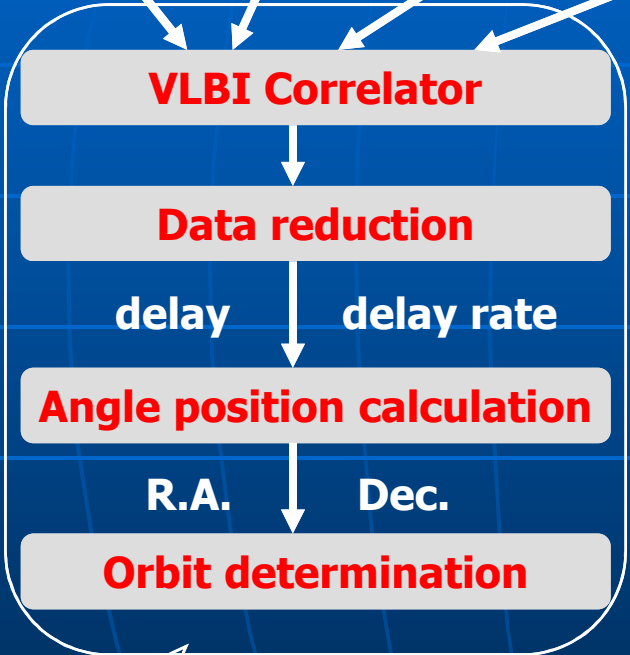
2006



# Correlator

- 4 station software VLBI correlator
- 5 stations hardware VLBI correlator (128MHz bandwidth)
  
- e-VLBI (16Mb/step) for 4 stations in 10 minutes

# Chung'E satellite tracking as lunar mission



**VLBI center**



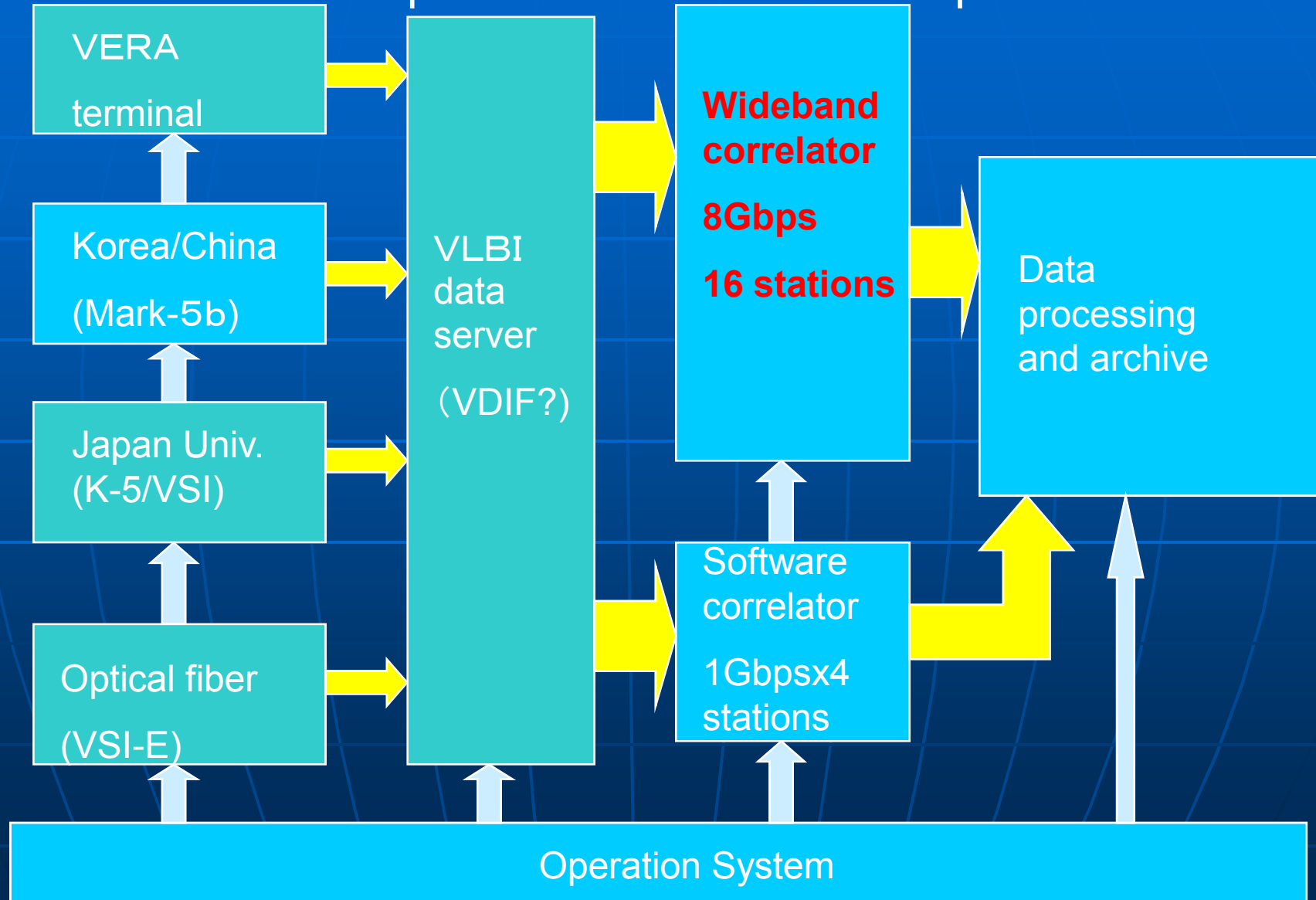
# Korea-Japan Collaboration for new correlator and data center development

- 2005-2009
  - KASI and NAOJ signed MOU for development
- Correlator at Seoul
- 8Gbps x 16 stations
- Usage
  - KVN
  - East Asia VLBI network
  - VSOP-2



# New Correlator at Seoul

-Joint development with Korea and Japan -



# EAVN/JVNの今後の整備計画

- 2008年
  - 高萩局の整備(6.7GHz冷却、8GHz常温)
  - K5/VSI 1Gbps化とソフト相関器の立ち上げ
  - 22GHz観測立ち上げ
  - 中国局との試験観測(256Mbps) 6.7GHz、8GHz
  - KVNとのフリンジ試験(256Mbps) 22GHz
- 2009年
  - 中国局との本格観測開始(256Mbps) 6.7GHz、8GHz、22GHz
  - KVNとの試験観測(256Mbps) 22GHz、43GHz
  - ソウル相関局立ち上げ
- 2010年
  - ソウル相関局の運用開始
  - 日中韓EAVNの試験観測開始(1Gbps)
- 2011年から 第1期定常化 (22GHz、8GHz)

# Master Schedule of East Asia VLBI Network - draft -

2006, Nov. 23

CY	2006				2007				2008				2009				2010				2011				2012				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
Network observation																													
JVN(128Mbps) 8GHz	—————				.....																								
JVN(128Mbps) 22GHz					←—————				.....																				
JVN(1Gbps) 8/22GHz									←—————				.....																
3mm(1Gbps)													←—————				.....												
JVN+CVN(128Mbps) 8/22													←—————				.....												
JVN+CVN(1Gbps) 8/22													←—————				.....												
VERA+KVN																	←—————				.....								
JVN+KVN+CVN																	←—————				.....								
KVN																													
System Construction	██████████				██████████				██████████				██████████																
Integration test													██████████																
Operation																	←.....												
Chung'E, SELENE(RISE)																													
					←—————																								
VSOP-2																													
					██████████				██████████				██████████				██████████				██████████				←.....				
Seoul Corr.																													
Correlator																													
Data PB																													
Operation system																													
Integration test																													
Operation																													
VERA software correlator																													
prototype	██████████																												
final products					██████████				██████████																				
operation test									██████████																				



# Assumed observation time(~2010)

	Observation s time	KVN only	VERA only	VERA+KV N	EAVN with KVN & VERA	EAVN without KVN & VERA
KVN	<b>5000</b>	<b>2500</b>		<b>1500</b>	<b>1000</b>	
VERA	<b>5000</b>		<b>2500 *</b>	<b>1500</b>	<b>1000</b>	
EAVN	<b>2000</b>				<b>1000</b>	<b>1000</b>



More than half will be allocated for VSOP2.

\*: including 1000 hrs geodesy observations

**Seoul correlator; 6000 hrs**

**Mitaka correlator; 2500 hrs**

# East Asia VLBI Workshop

20-22 March 2008, Shanghai, China



# 東アジアVLBIワークショップ(第2回)

- 日時 2009年3月18-20日
- 場所 ソウル、延世大学
- ステータス報告
- 共同観測提案
  - VERA+KVN Astrometry観測
  - JVN+CVN VSOP2試験観測
- 観測網の組織化