New Project for Constructing a VLBI2010 Antenna in Japan

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Introduction myself (FUKUZAKI)

I have been working in GSI VLBI group since 1994. My main tasks were;

- Operation of Kashima 26m station (It was removed in 2003.)
- Construction of Tsukuba 32m antenna and other GSI’s antennas (1995 to 1998)
- Syowa VLBI experiment on Antarctica (Wintering from Dec. 1998 to Feb. 2000)
- Group leader of GSI VLBI group in 2000 & 2001
- Correlation & Analysis of Antarctic VLBI data in Bonn, Germany in 2002

Recently, I re-joined GSI VLBI group for a new project for constructing a new antenna!

Tsukuba 32-m antenna
GSI’s VLBI Network & Components

Network Stations (in Japan)

Present GSI’s VLBI Network
(GSI Advanced Radiotelescope NETwork: GARNET)

Correlator
Software-based correlator developed by NICT
Mainly, the following sessions are processed
- JADE (Japanese Domestic)
- JAXA (another Domestic)
- INT2

Analysis Center
CALC/SOLVE
OCCAM
C5++
Mainly, the following sessions are analyzed
- Global solution
- Rapid dUT1 production
New Project for VLBI2010 in Japan

• Budget for a new antenna & facility obtained.
• Fully corresponding to VLBI2010 concept
• Observing facility including the following parts,
  1. Antenna (Single)
  2. Front-end
  3. Up-Down Converter
  4. Data Processing & Acquiring System
  5. Precise Frequency Standard (H-maser)
  (6. Operations Building)
Components

Antenna side

1. Antenna
2. Front-end

Operation Building side

3. Up-Down Converter
4. Data Processing & Acquiring System
5. Precise Frequency Standard (H-maser)

(6. Operations Building)
1. Antenna (Single type)

- Diameter: 12-14m
- Frequency: 2-14GHz
- Aperture Efficiency: ≥ 50%
- Antenna Noise Temperature: ≤ 10K (Excl. Atmosphere Contribution)

Eleven feed is assumed for antenna design.

Reference Point Stability & Path Length Stability are proposed.
Reference Point should be measured directly from the ground for Co-location!

Driving Speed
- Az slew rate: 12 deg/sec
- El slew rate: 3.5 deg/sec
- Az acceleration: 3 deg/sec²
- El: acceleration: 3 deg/sec²

Optical Fiber cable: from Antenna to Building
2. Front-end

Eleven feed is assumed for antenna design.
Frequency: 2-14GHz

Receiver Noise Temperature: < 30K
System Noise Temperature: < 40K
(Excl. Atmosphere Contribution)

P-cal & D-cal (or the same function) will be installed.

Injection of P-cal/Noise source in the front of the Feed
3. Up-Down Converter

Input: 2-14GHz (Both linear polarizations)
Output: 1-2GHz/ch
(USB or LSB : selectable)

Number of channel: 8ch in total
(2polarization*4ch)

1st LO: Programmable with 0.4MHz step
2nd LO: Fixed (2 LOs for USB and LSB)
4. Data processing & Acquiring System

Sample rate: 2048 Msample/sec
Quantization: 1/2/4/8 bits (or more bits)

Digital Back-end (IVS recommended type)

Data Storage: ≥ 400TB
5. Precise Frequency Standard

H-maser will be installed.

GPS time receiver will also be installed.

Clock comparison system will also be installed.
Site Candidate

Here! (near Tsukuba)
Summary

• New project for constructing a new antenna has started in Japan.
• A new VLBI observing facility will be installed, fully corresponding to VLBI2010 concept.
• Next July, bids & contract will be done.
• Construction will be complete by the end of March, 2013 (It depends on the antenna manufacturer).
Thank you very much for your attention!