

Tsukuba 32-m VLBI Station

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Abstract

This report summarizes the activity at Tsukuba 32-m VLBI station by the Geographical Survey Institute (GSI) VLBI group. In 2002, Tsukuba 32-m VLBI station has participated in a total of 50 international sessions, as well as 7 domestic experiments (JADE sessions). We have also made a local tie survey at Shintotsukawa VLBI station in October 2002.

1. General Information

Tsukuba 32-m VLBI station (TSUKUB32) was constructed in the premises of Geographical Survey Institute in 1998 (Figure 1, Table 1). It is located approximately 60 km northeast of Tokyo, Japan, in a city called “Science City” that has many public and private scientific research institutes. TSUKUB32 has been operational as a main dish of GSI, performing geodetic VLBI experiments on a regular basis in a variety of international and domestic VLBI sessions. In 2002, TSUKUB32 has participated in 50 international sessions and 7 domestic experiments listed in Table 2.

GSI has four permanent VLBI stations in Japan, which form the GSI’s domestic VLBI network named GARNET (GSI Advanced Radiotelescope Network). Note that Kashima 26-m station (KASHIMA) has retired from GARNET in 2002 and is now under de-construction. Before the birth of TSUKUB32, the GSI VLBI group had operated KASHIMA, which was constructed in 1968 as a Communications Research Laboratory (CRL)’s facility, and its ownership was transferred to GSI in 1992. KASHIMA, which is the first VLBI antenna in Japan, significantly contributed to the advancement of the early VLBI in Japan. Even after TSUKUB32 took over KASHIMA’s duty, KASHIMA had contributed to observations as a network station of GARNET and a reference station in Japan.

Table 1. Location and address of Tsukuba 32m VLBI station

Latitude (deg)	36.1031 N
Longitude (deg)	140.0887 E
Altitude	44.7m
Address	Geographical Survey Institute Kitasato 1 Tsukuba Ibaraki 305-0811 JAPAN
Web	http://vlb.db.gsi.go.jp/sokuchi/vlbi/english/
email	vlbi@gsi.go.jp

2. Component Description

The current configuration of TSUKUB32 is shown in Table 3. In 2002, we have made some system improvements. The version of current implemented Field System is FS-9.5.12. The firmware of Mark IV formatter has been upgraded to version 31 in August 2002. The frequency range of S band filter has been modified to 2215 - 2369MHz to avoid RFI from IMT-2000 (cellular phone).



Figure 1. Tsukuba 32-m VLBI antenna

Table 2. The experiments at Tsukuba 32m VLBI station in 2002

Experiment	Code	Number
IVS-R	R1003,07,08,10,11,15,16,20,22,24,26,33,34,35,39,45,47	17
IVS-T	T2001,2002,2005,2006,2009,2010,2011,2012	8
VLBA	RDV31,32,35	3
APSG	APSG10,11	2
JADE(regular)	JD0201,0202,0205,0206,0207	5
JADE(remote)	JD0203,0204	2
UT1	K02182-K02353	20
Total		57

Table 3. Configuration of Tsukuba 32m antenna

Site 8-letter code	TSUKUB32	2-letter	Ts
IERS DOMES number	21730S007	CDP number	7345
Site Position (ITRF2000)	before Apr. 1999	Site Position (+43.7mm UP)	after Apr. 1999
X (m)	-3957408.752	X (m)	-3957408.725
Y (m)	3310229.367	Y (m)	3310229.390
Z (m)	3737494.789	Z (m)	3737494.815
X band SEFD (Jy)	320	S band SEFD (Jy)	360
Az slew 3.0 deg/sec	Range 10.0 - 710.0	El slew 3.0 deg/sec	Range 5.0 - 88.0
S-band w/BPF	2215-2369MHz	X1-band	7780-8280MHz
X2-band	8180-8680MHz	X3-band	8580-8980MHz

3. Staff

The staff of VLBI group at GSI has changed. Table 4 lists the present staffs.

Table 4. Staff working at GSI VLBI group

Name	Position	Working Area
Shigeru MATSUZAKA	IVS Networks Representative	
Hiromichi TSUJI	Supervisor of VLBI group	
Tadashi TANABE	Leader of VLBI group	
Hiroshi KAWAWA	Collocation chief	Collocation
Kazuhiro TAKASHIMA	VLBI chief	Experiments Coordination, Operation
Kohei MIYAGAWA	Analysis chief	Correlation, Operation
Shinobu KURIHARA	Operator	Baseline Analysis, Operation

Ms. S. Yoshida left GSI at the end of December 2002 due to the expiration of her contract term. Mr. Y. Fukuzaki is visiting Bonn University from the beginning of March 2002 for one year as a visiting scientist.

4. Current Status and Activities

In 2002, domestic experiments using GARNET were carried out five times with local operators, and two times with remote controlled operations from Tsukuba. These experiment sessions are named JADE (Japanese Dynamic Earth observation by VLBI). Many Japanese VLBI stations, such as GIFU11, TOMAKO11, KASHIM11, KASHIM34, MIZNAO10, MIZNAO20, have participated in JADE sessions. The results of JADE sessions are available on the GSI VLBI Web page (<http://vldb.gsi.go.jp/sokuchi/vlbi/sess/index.html>).

The local tie survey at Shintotsukawa VLBI station with nearby GPS stations was made in October 2002. The result is now under preparation.

From July 1st to December 19th, 2002, a total of 20 intensive sessions for the determination of UT1 were carried out at the Tsukuba-Wettzell baseline (Figure 2) using the K-4 system developed by Communications Research Laboratory(CRL) of Japan. The result is given at the Tsukuba VLBI Correlator report of this issue.

A very high speed optical network (Figure 3) has been installed at Tsukuba station by our joint project with National Astronomical Observatory of Japan (NAOJ). A 2 Gbps e-VLBI fringe test was successfully accomplished on December 11th at the 140-km baseline between TSUKUB32 (GSI) - USUDA64 (ISAS). In the test, 2 bits 1GHz sampling data with 500 MHz Bw IF signal were correlated in real time at the Mitaka correlator.

5. Future Plans

It is planned to increase the number of JADE sessions to 12 per year (one each month) fully utilizing the remote control system in 2003. K-4 UT1 intensive sessions at the Tsukuba-Wettzell baseline will also be performed on a regular basis, hopefully one weekend day after April 2003. In

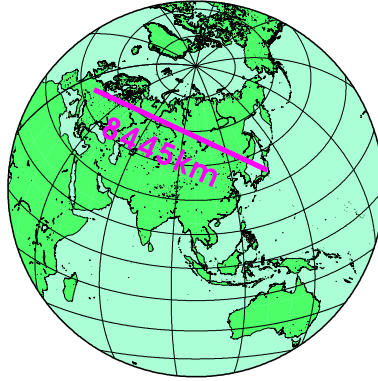


Figure 2. The baseline of Tsukuba-Wetzell for UT1 session



Figure 3. The terminal of Giga-bit IP network

the following year, we will try to increase the sessions to two weekend days.

We will install the Field System at Aira, Chichijima and Shintotsukawa station in 2003.

A K-5 system using four versatile scientific sampling processors (VSSP) based on PC will be installed at Tsukuba 32-m station. It is capable of recording 16 channels and a total of 256Mbps data recording. We would like to use these K-5 techniques for UT1 intensive sessions in future.

References

- [1] K. Takashima, Y. Fukuzaki: Tsukuba 32-m VLBI station, IVS 2001 Annual Report, February 2002
- [2] Takashima, K., S. Kurihara, M. Ishihara, K. Nemoto, M. Iwata, K. Shiba, M. Onogaki, and K. Kobayashi: Status and Results of GSI Domestic VLBI Networks, Bull. Geograph. Surv. Inst., Vol. 46, pp.1-9, March 2000