

JARE Syowa Station 11-m Antenna, Antarctica

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Abstract

The Japanese Antarctic Research Expeditions (JAREs) are making quasi-regular geodetic VLBI experiments from February 1998 at Syowa Station (69.0 degS, 39.6 degE), Antarctica, using an 11 m antenna with participation of Hobart and Hartebeesthoek 26 m antennas. We have made a total of 43 sessions from February 1998 until the end of January 2003. Among them, there are 29 SYW sessions and 13 COHIG (or OHIG) sessions, respectively. The number of analyzed baselines solutions increased from 11 of the 2001 year report to 18 of this 2002 year report. In the year 2003, we will make 4 SYW sessions and 2 OHIG sessions. Among the parallel-going geodesy programs such as GPS, DORIS, etc., ERS-2 SAR data acquisition will end before April 2003, and old SG (GWR TT70) is being replaced with a new SG (CT#043).

1. Introduction

As reported in [1], southern hemisphere geodetic VLBI experiments at Syowa Station (69.0 degS, 39.6 degE) have been continuing with participation of the University of Tasmania 26 m antenna at Hobart and the Hartebeesthoek Radio Astronomical Observatory (HartRAO) 26 m antenna in South Africa. From February 1999, the experiments were named the SYW sessions under the coordination of the IVS Coordinating Center and four 24-hour experiments (SYW021 through SYW024) were made in 2002. The observation system is maintained by trained JARE wintering members; by JARE-42 (Feb. 2001 - Jan. 2002) and by JARE-43 (Feb. 2002 - Jan. 2003). Because weathering proceeded in the radome panels, about 20 panels were replaced with new ones in January 2002 (Figure 1). When ADEOS-II becomes operational, the most frequent receiving will be its GLI data. Syowa VLBI antenna is registered 66006S004 as the IERS Domes Number, and 7342 as the CDP Number.

2. Antenna Specifications

There was no significant change to the configuration of the “mechanical system”, “receiver system”, “hydrogen maser and time comparison system”, and “VLBI backend system” which were described in the 1999 IVS Annual Report [2]. We add some recent maintenance notes below. The hydrogen maser set (Anritsu RH401A; 1002C), which was returned to Tokyo after malfunctioning in July 2000, was again brought into Syowa Station in January 2003 after repair and is being prepared for re-startup. The other set 1001C was in good condition during the 2002 year operation, and the GPS receiver enabled us to monitor the UTC-recorder time offset of about 3 microseconds. Some recorder-controller troubles occurred during the SYW024 and SYW025 experiments, and a few tens of observations were lost. We will replace the VSC7210 controller in the “VLBI backend system” with a spare one.

3. On-going Project

Table 1 summarizes status of processing as of January 2003 for the sessions in which Syowa Station participated. For those by JARE-39, only SYOWA984 successfully reached the geodetic



Figure 1. Because of weathering, about 20 radome panels were replaced with new ones in January 2002.

solution. The correlation was made using the FX correlator at Mitaka/NAO, and FITS-database was analyzed by software developed by T. Jike from NAO Mizusawa. From SYW991 by JARE-40, the FX correlator was adapted to make time-tagged S2-K4 copying and subsequent K4-K4 processing to produce the MarkIII database. This was done using the GSI or CRL correlator. CALC/SOLVE solutions were obtained for the 9 experiments until now. Owing to the development of the K4-MarkIII tape copier in GSI, Syowa Station could participate in 13 COHIG (or OHIG) experiments, and processing at the Bonn Correlator gave 9 baseline solutions until now. The latest tapes brought back by “Shirase” were OHIG19 tapes, and they were operated by JARE-43 staffs for the first time. The processing reached the geodetic solution, promising no system problems during the wintering of JARE-43. The tapes after SYW022 sessions are now on their way back to Tokyo.

4. Staffs for the JARE Syowa Station 11-m antenna

- Kazuo Shibuya, Project coordinator at NIPR.
- Koichiro Doi and Shigeru Aoki, Liaison officer at NIPR.
- Yoshihiro Fukuzaki (from GSI), Chief operator of JARE-40 (Feb. 1999 - Jan. 2000).
- Takeshi Ino (from NEC), Antenna engineer for JARE-40.
- Koichiro Doi (from NIPR), Chief operator of JARE-41 (Feb. 2000 - Jan. 2001).
- Seiji Takao (from NEC), Antenna engineer for JARE-41.
- Sachiko Iwano (from Kyoto Univ.), Chief operator of JARE-42 (Feb. 2001 - Jan. 2002).
- Yoshitaka Tamura (from NEC), Antenna engineer for JARE-42.
- Katsumi Sakura (from Hokkaido Univ.), Chief operator of JARE-43 (Feb. 2002 - Jan. 2003).
- Motoshi Abe (from NEC), Antenna engineer for JARE-43.

5. Analysis Results

By the end of 2002, 16 sessions from August 1999 to February 2002 have been analyzed. The change of baseline lengths for Syowa-Hobart, Syowa-HartRAO, and Syowa-O'Higgins were calculated. The coordinates of Syowa antenna reference point were also determined with an accuracy of 6-15 mm. The results will be presented by Fukuzaki and other 7 coauthors from 4 countries under the title of "An Analysis of Antarctic VLBI experiments carried out at Syowa Station, Antarctica" at the 23rd IUGG2003 General Assembly to be held at Sapporo, June 30 - July 11, 2003.

Table 1. Status of SYW and COHIG experiments as of January 2003

Code	Start time (UT)	Obs. hour	Correlation	Solution	Remarks
JA9804	1998/Feb/09 08:13	48 h	S only	No	JARE-39
JA9813	1998/May/11 08:00	48 h	partial	No	op T. Jike
JA9822	1998/Aug/09 08:00	48 h	No	No	eng T. Tanaka
SYOWA984	1998/Nov/09 08:00	48 h	Yes	Yes	
CRF07	1999/Feb/15 10:00	24 h	No	No	(1) JARE-40
SYW991	1999/Feb/17 05:00	24 h	Yes	Yes	(2) op Y. Fukuzaki
COHIG6	1999/Feb/18 12:00	24 h	No	No	(1) eng T. Ino
SYW992	1999/May/13 06:00	24 h	Not yet	Not yet	
SYW993	1999/Jul/15 08:00	24 h	Not yet	Not yet	
SYW994	1999/Aug/26 08:00	24 h	Yes	Yes	
SYW995	1999/Sep/09 08:00	24 h	Yes	Yes	
SYW996	1999/Oct/07 08:00	24 h	Yes	Yes	
COHIG7	1999/Nov/08 15:00	24 h	Yes	Yes	
COHIG8	1999/Nov/10 19:00	24 h	Yes	Yes	
COHIG9	1999/Nov/11 20:00	24 h	Yes	Yes	
SYW997	1999/Nov/18 08:00	24 h	Yes	Yes	

Code	Start time (UT)	Obs. hour	Correlation	Solution	Remarks
SYW008	2000/Feb/02 10:00	24 h	Yes	Yes	JARE-41
COHIG12	2000/Feb/10 12:00	24 h	Yes	Yes	op K. Doi
SYW009	2000/Mar/20 08:00	24 h	Not yet	Not yet	eng S. Takao
SYW010	2000/Jul/03 08:00	24 h	Not yet	Not yet	
SYW011	2000/Aug/09 08:00	24 h	Yes	Yes	
SYW012	2000/Sep/11 08:00	24 h	Not yet	Not yet	
SYW013	2000/Oct/05 08:00	24 h	Yes	Not yet	
COHIG13	2000/Oct/09 14:00	24 h	Yes	Yes	
SYW014	2000/Nov/20 08:00	24 h	Not yet	Not yet	
SYW015	2000/Dec/07 08:00	24 h	Yes	Yes	
SYW016	2001/Feb/07 08:00	24 h	Not yet	Not yet	JARE-42
COHIG14	2001/Feb/14 18:30	24 h	Yes	Yes	op S. Iwano
COHIG15	2001/Feb/19 14:00	24 h	Yes	Yes	eng Y. Tamura
SYW017	2001/Apr/23 08:00	24 h	Not yet	Not yet	
SYW018	2001/Jul/30 08:00	24 h	Not yet	Not yet	
SYW019	2001/Oct/04 08:00	24 h	Not yet	Not yet	
SYW020	2001/Nov/14 08:00	24 h	Not yet	Not yet	
COHIG16	2001/Nov/26 14:00	24 h	Yes	Yes	
SYW021	2002/Jan/16 08:00	24 h	Not yet	Not yet	
OHIG19	2002/Feb/11 14:00	24 h	Yes	Yes	
SYW022	2002/Apr/29 08:00	24 h	Not yet	Not yet	JARE-43 (3)
SYW023	2002/Aug/12 08:00	24 h	Not yet	Not yet	op K. Sakura
SYW024	2002/Nov/04 08:00	24 h	Not yet	Not yet	eng M. Abe
OHIG20	2002/Nov/12 17:30	24 h	Not yet	Not yet	
OHIG22	2002/Nov/20 18:00	24 h	Not yet	Not yet	
SYW025	2003/Jan/16 08:00	24 h	Not yet	Not yet	
OHIG23	2003/Jan/20 14:00	24 h	Not yet	Not yet	

Notes:

- (1) Time stamps were not correctly recorded in Syowa K4 tapes.
- (2) One baseline between Syowa and Kashima.
- (3) JARE-43 tapes after SYW022 will arrive Tokyo in mid April of 2003.

References

- [1] Shibuya, K., Doi, K. and Aoki, S. (2002): JARE Syowa Station 11-m Antenna, Antarctica, in International VLBI Service for Geodesy and Astrometry 2001 Annual Report, 119-122, NASA/TP-2002-210001, ed. by N.R. Vandenberg and K. Baver.
- [2] Shibuya, K. and Doi, K. (1999): JARE Syowa Station 11-m Antenna, Antarctica, in International VLBI Service for Geodesy and Astrometry 1999 Annual Report, 105-109, NASA/TP-1999-209243.