

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 deg S, 39.6 deg E), Antarctica, using an 11 m antenna with participation of the Hobart and Hartebeesthoek 26 m antennas. We have made a total of 25 sessions from February 1998 until January 2002. Although difficulty in tape transport (once per year) will not be solved in the very near future, delay of correlator processing to produce the database will be relaxed, as time-tag copying of K4 tapes and S2-K4 copying has become the operational mode. From 2001, the number of sessions was reduced to four to five compared to eight for previous years, but will be kept until 2004. We are continuing parallel space geodesy observations and other programs (GPS, DORIS, SAR data acquisition, SG observations, etc.) and their status summary is included.

1. Introduction

As reported in [1], southern hemisphere geodetic VLBI experiments at Syowa Station (69.0 deg S, 39.6 deg E) have been continuing with the 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 the February 1999 experiments, they were named the SYW sessions under the coordination of the IVS Coordinating Center, and four 24-hour experiments were made in 2001 as compared to eight for 2000. The observation system is maintained by trained JARE wintering members; by JARE-41 (Feb. 2000 - Jan. 2001) and by JARE-42 (Feb. 2001 - Jan. 2002). The Syowa VLBI antenna is registered with 66006S004 as the IERS Domes number, and 7342 as the CDP number. The collocated IGS GPS antenna (IERS Domes Number 66006S002) is shown in Figure 1.



Figure 1. Syowa VLBI antenna with radome and the IGS GPS antenna

2. Antenna Specifications

There was no significant change to the configuration of the “mechanical system”, “receiver system”, “hydrogen maser systems and time comparison”, and “VLBI backend system” which

were described in the 1999 IVS Annual Report [2]. Some additional notes were described in the 2000 IVS Annual Report [1], and they are briefly summarized/modified as: (1) In January 1999, an HP workstation was installed to make a schedule file at Syowa Station, and the file was transferred to the IVS Coordinating Center in order that the other two stations could access the file. The schedule format was adjusted to the standard S2-FS9 system with the support of the IVS Coordinating Center. (2) SEFD values in Table 1 of the 2000 IVS Annual Report [2] correspond to environmental temperatures above -10 deg C, and they become worse around 10,000 when the air temperature in the radome becomes lower. (3) The hydrogen maser set (Anritsu RH401A; 1002C) which was returned to Tokyo after malfunctioning in July 2000, could not be brought back to Syowa Station yet; thus there is no spare hydrogen maser during the coming 2002 experiments by JARE-43. The other set 1001C was in good condition during the 2001 operations, and a GPS receiver enabled us to monitor the UTC-recorder time offset of about 2 microseconds.

3. On-going Project

Table 1 summarizes the status of processing as of January 2002 for the sessions in which Syowa Station participated. For those in JARE-39, only SYOWA984 successfully reached a geodetic solution. The correlation was made using the FX correlator at Mitaka/NAO, and the FITS-database was analyzed by newly developed software as mentioned by Jike et al. [3]. From SYW991 through SYW997 in JARE-40, the FX correlator functions were adapted to make time-tagged S2-K4 copying and subsequent K4-K4 processing to produce the MarkIII database using the GSI correlator. CALC/SOLVE solutions were obtained for the SYW995 through SYW997 experiments as shown by Fukuzaki et al. [4]. For the tapes in JARE-41, SYW015 session (the last returned in JARE-41) was found to result in a geodetic solution, indicating no system problem during winter. The tapes after SYW017 sessions are now on their way back to Tokyo via the Icebreaker Shirase. Syowa Station participated in nine COHIG experiments, which became possible due to the development of the K4-MarkIII tape copier in GSI. Their status should be described in the Bonn Correlator report. Although COHIG13 was successfully correlated, its geodetic solution is not obtained yet. After publication of the analyses by Jike et al. [3] and Fukuzaki et al. [4], the related database will freely be available.

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

- Kazuo Shibuya, Project coordinator at NIPR.
- Koichiro Doi and Shigeru Aoki, Liaison officers at NIPR.
- Yoshihiro Fukuzaki (from GSI), Chief operator of JARE-40 (Feb. 1999 - Jan. 2000).
- Takeshi Ino (from NEC), Antenna maintenance staff of JARE-40.
- Koichiro Doi (from NIPR), Chief operator of JARE-41 (Feb. 2000 - Jan. 2001).
- Seiji Takao (from NEC), Antenna maintenance staff of JARE-41.
- Sachiko Iwano (from Kyoto Univ.), Chief operator of JARE-42 (Feb. 2001 - Jan. 2002).
- Yoshitaka Tamura (from NEC), Antenna maintenance staff of JARE-42.

Table 1. Status of SYW and COHIG experiments as of January 2002

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	Not yet	Not yet	
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	
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	Not yet	Not yet	
SYW012	2000/Sep/11 08:00	24 h	Not yet	Not yet	
SYW013	2000/Oct/05 08:00	24 h	Not yet	Not yet	
COHIG13	2000/Oct/09 14:00	24 h	Yes	No	(3)
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 (4)
COHIG14	2001/Feb/14 18:30	24 h	Not yet	Not yet	op S. Iwano
COHIG15	2001/Feb/19 14:00	24 h	Not yet	Not yet	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	Not yet	Not yet	
SYW021	2002/Jan/16 08:00	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) The reason for the failed solution is not known yet. (4) JARE-42 tapes after SYW016 will arrive in Tokyo in mid-April of 2002.

5. Collocated Observations

Syowa Station is located in the interior of the geologically stable Antarctic plate. It is situated on firm bedrock without a sedimentary layer. As a global network component of space geodesy,

and in order to monitor long-term geophysical phenomena, Syowa Station is continuing parallel observations as summarized in Figure 2.

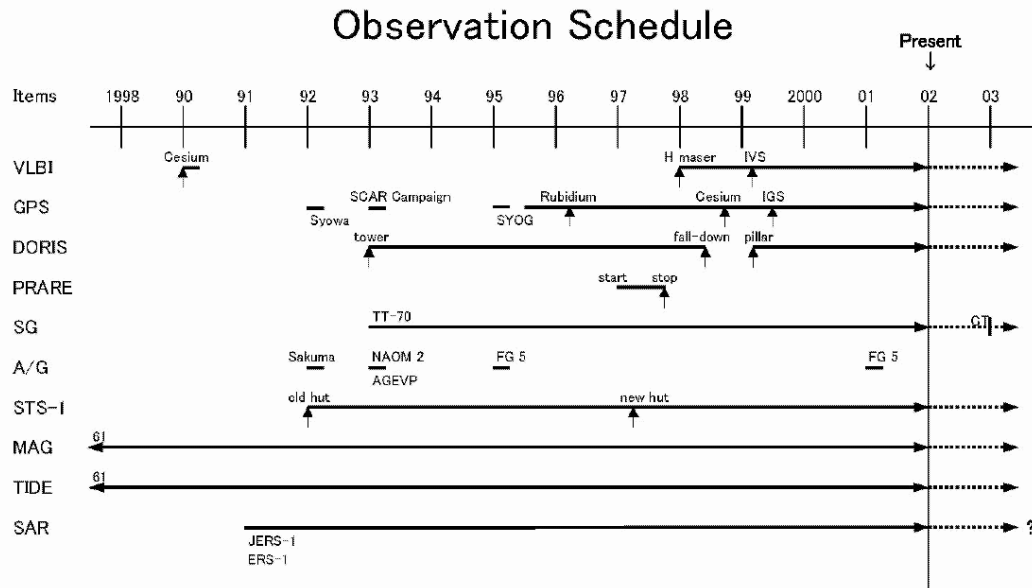


Figure 2. Status of continuous monitoring observations at Syowa Station

References

- [1] Shibuya, K., Aoki, S. and Doi, K. (2001): JARE Syowa Station 11-m Antenna, Antarctica, in International VLBI Service for Geodesy and Astrometry 2000 Annual Report, 127-130, NASA/TP-2001-209979.
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