

# JARE Syowa Station 11-m Antenna, Antarctica

*Koichiro Doi, Kazuo Shibuya*

## Abstract

The operation of the 11 m S/X-band antenna at Syowa Station (69.0°S, 39.6°E) by the Japanese Antarctic Research Expeditions (JAREs) started from February 1998 and continues till today (March 2007). The number of quasi-regular geodetic VLBI experiments attained 72 at the end of 2006.

Data of all OHIG sessions and CRD sessions in 2006 were recorded on hard disks through the K5 terminal. The K5 hard disks were brought back from Syowa Station to Japan. From the NICT server the data were electronically transferred to MIT Haystack Observatory, where they were converted to the Mark 5 format. And the Mark 5 data were then sent to the destination Mark 5 Correlator for the final correlation.

Syowa Station will participate in four OHIG sessions in 2007. The antenna time drastically decreased as receiving activity of remote sensing satellites became very low. We like to increase, with the help of the observing program committee, the OHIG sessions than those planned in the 2007 year schedule.

## 1. Overview

Syowa Station has become one of the key observatories in the southern hemisphere geodetic network, as reported in [1]. As for VLBI, Syowa antenna is registered 66006S004 as the IERS Domes Number, and 7342 as the CDP Number. Basic configuration of the Syowa VLBI front-end system did not change from the description in [2].

K5 recording system was introduced to Syowa Station in September 2004 and some tests were carried out to confirm normal data recording. Syowa's recording terminal K4 was fully replaced by K5 simultaneously with the termination of SYW session at the end of 2004. Syowa participates in the OHIG sessions. VLBI data transfer through Intelsat link became possible following the introduction of the K5 system and it may accelerate the correlation process; the transfer rate, however, from Syowa Station to NIPR is not faster than 0.5 – 1 Mbps.

## 2. Notes on System Maintenance

There is no significant problem in the “mechanical system”. The hydrogen maser set (Anritsu RH401A; 1001C), which was in good condition until 2003 was brought back to Japan for overhaul (H2 ran out). The 1002C was used for the observations done in the years 2004 to 2006. JARE-48 will install 1001C again at Syowa Station (planned for March 2007). The tube in the Cs frequency comparator has to be changed, and the video-converter/local oscillator has to be replaced with a new one in the near future.

## 3. Session Status

Table 1 summarizes the status of processing as of January 2007 for the sessions after 2003. The SYW session consisted of Syowa (Sy), Hobart (Ho) and HartRAO (Hh). The OHIG sessions involved Fortaleza (Ft), O'Higgins (Oh) and Kokee Park (Kk) with TIGO Concepcion (Tc) from November 2002, together with the 3 SYW antennas. In 2005, Syowa joined the CRD sessions instead of SYW sessions. Syowa participated in six OHIG sessions in 2006.

Until 2004, OHIG sessions' data on K4 tapes from Syowa Station were copied to Mark IV tapes at GSI and the Mark IV tapes were sent to the Mark IV Correlator for final correlation. After introducing the K5 system, K5 hard disk data brought back from Syowa Station were ftp transferred to MIT Haystack Observatory through NICT server and converted to the Mark 5 format data there.

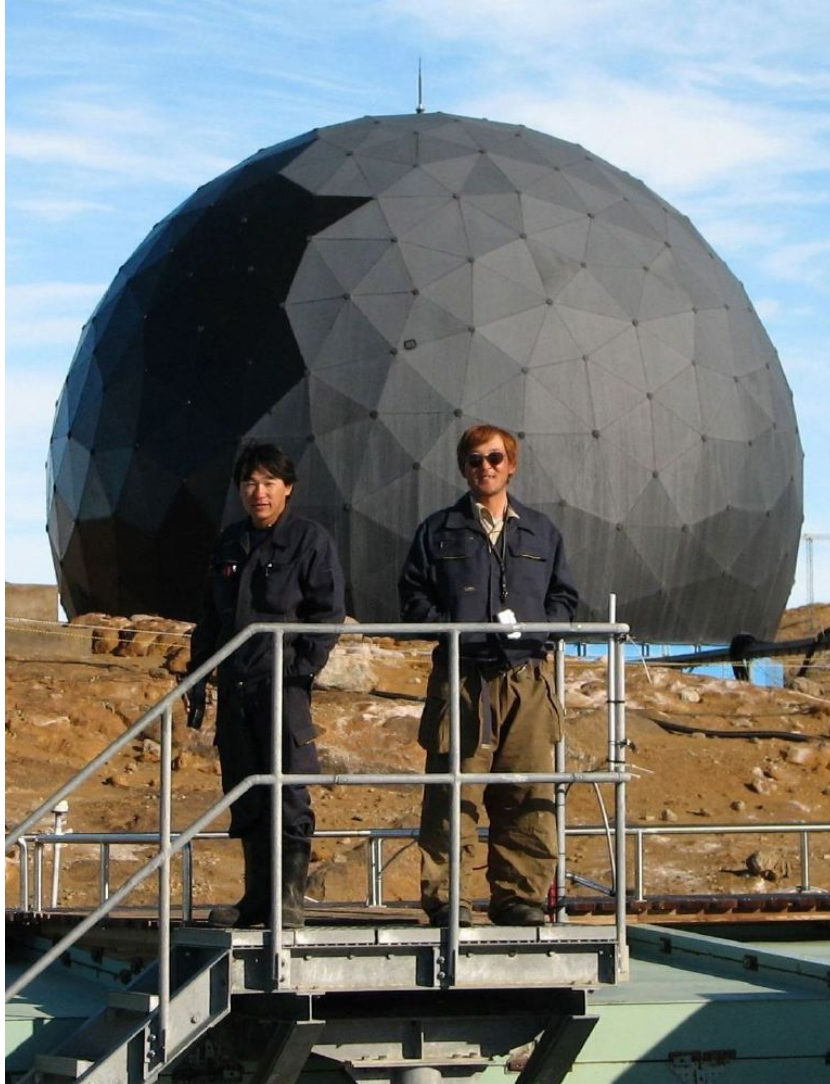


Figure 1. Syowa VLBI staff for JARE-47 (Feb. 2006 - Jan. 2007).

#### 4. Staff of the JARE Syowa Station 11-m Antenna

- Kazuo Shibuya, Project coordinator at NIPR.
- Koichiro Doi, Liaison officer at NIPR.
- Kuniko Egawa (from Japan Hydrographic Association), Chief operator for JARE-46 (Feb.

2005 - Jan. 2006).

- Isao Okabayashi (from NEC), Antenna engineer for JARE-46.
- Takanobu Sawagaki (from Hokkaido University), Chief operator for JARE-47 (Feb. 2006 - Jan. 2007). (right in Figure 1)
- Hiroshi Ishii (from NEC), Antenna engineer for JARE-47. (left in Figure 1)

Table 1. Status of SYW and OHIG experiments as of January 2007

Code	Date	Station	Hour	Correlation	Solution	Notes
SYW026	2003/Apr/10	Ho, Hh	24 h	Yes	Yes	(J44)
SYW027	2003/Aug/06	Ho, Hh	24 h	Yes	Yes	
OHIG27	2003/Nov/19	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
SYW028	2003/Nov/26	Ho, Hh	24 h	Not yet	Not yet	
OHIG28	2003/Dec/03	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	
SYW029	2004/Jan/07	Ho, Hh	24 h	Yes	Yes	
OHIG29	2004/Feb/10	Ho, Hh, Ft, Oh, Tc	24 h	Yes	Yes	(J45)
SYW030	2004/Apr/07	Ho, Hh	24 h	Yes	Yes	
SYW031	2004/Aug/18	Ho, Hh	24 h	Yes	Yes	
OHIG32	2004/Oct/26	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
OHIG33	2004/Nov/09	Ho, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
OHIG34	2004/Nov/30	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
OHIG35	2004/Dec/08	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
SYW032	2004/Dec/13	Ho, Hh	24 h	Yes	Yes	
OHIG36	2005/Jan/26	Ho, Hh, Ft, Oh, Kk	24 h	Yes	Yes	
OHIG37	2005/Feb/02	Ho, Hh, Ft, Oh, Kk	24 h	Yes	Yes	(J46)
OHIG38	2005/Feb/15	Ho, Hh, Ft, Oh, Kk	24 h	Yes	Yes	
CRDS18	2005/Apr/11	Ho, Hh	24 h	Not yet	Not yet	
CRDS19	2005/May/10	45, Hh	24 h	Yes	Not yet	
OHIG39	2005/Nov/08	Ho, Hh, Ft, Oh, Kk	24 h	Yes	Yes	
OHIG40	2005/Nov/09	Ho, Hh, Ft, Oh, Kk	24 h	Yes	Yes	
OHIG41	2005/Nov/16	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	
OHIG42	2006/Jan/31	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	(J47)
OHIG43	2006/Feb/08	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	
OHIG44	2006/Feb/14	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	
OHIG45	2006/Nov/07	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	
OHIG46	2006/Nov/14	Ho, Hh, Oh, Kk, Tc	24 h	Not yet	Not yet	
OHIG47	2006/Nov/29	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	

(1) 45: DSS45

(J44) JARE-44: op H. Ikeda eng. K. Soeda (J45) JARE-45: op K. Doi eng K. Fukuhara

(J46) JARE-46: op K. Egawa eng I. Okabayashi (J47) JARE-47: op T. Sawagaki eng H. Ishii

## 5. Analysis Results

At the end of 2006, 47 sessions from May 1999 through November 2005 have been analyzed with the software CALC/SOLVE developed by NASA/GSFC. The data of 4 sessions by JARE-47 (4 OHIG) are not returned yet.

The length of the Syowa-Hobart baseline is increasing with a rate of  $54.0 \pm 0.6$  mm/yr. The Syowa-HartRAO baseline shows slight increase with a rate of  $11.5 \pm 0.5$  mm/yr. These results agree approximately with those of GPS. We do not detect obvious change in the Syowa-O'Higgins baseline. Detailed results from the data until the end of 2003 as well as comparisons with the results from other space geodetic techniques are reported in [3].

## References

- [1] Shibuya, K., Doi, K. and Aoki, S. (2003): Ten years' progress of Syowa Station, Antarctica, as a global geodesy network site. *Polar Geoscience*, 16, 29-52.
- [2] Shibuya, K., Doi, K. and Aoki, S. (2002): JARE Syowa Station 11-m Antenna, Antarctica, in *International VLBI Service for Geodesy and Astrometry 2002 Annual Report*, 149-152, NASA/TP-2003-211619, ed. by N.R. Vandenberg and K.D. Baver.
- [3] Fukuzaki, Y., Shibuya, K., Doi, K., Ozawa, T., Nothnagel, A., Jike, T., Iwano, S., Jauncey, D.L., Nicolson, G.D. and McCulloch, P.M. (2005): Results of the VLBI experiments conducted with Syowa Station, Antarctica. *J. Geod.*, 79, 379-388.