JARE Syowa Station 11-m Antenna, Antarctica

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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 in February 1998 and continues till today (January 2006). The number of quasi-regular geodetic VLBI experiments reached 66 at the end of 2005.

We report firstly that Syowa started to participate in the CRF deep-south (CRD) session instead of the SYW session. Secondly, we fully replaced the K4 back-end terminal with a K5 terminal in January 2005 after the final SYW session in December 2004. Data of all OHIG and CRD sessions in 2005 were recorded on hard disks through the K5 terminal.

Syowa Station will participate in six OHIG sessions and two CRD sessions in 2006. 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 and CRD sessions than those planned in the 2006 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. The Syowa experiments consist of OHIG session and CRD session now. VLBI data transfer through Intelsat link became possible following the introduction of the K5 system and it can accelerate the correlation process, though the transfer rate from Syowa Station to NIPR is no more than 0.5 - 1 Mbps. We will try to transfer one or two sessions' whole data through the network link in 2006.

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 2004 and 2005 year observations. JARE-48 will install 1001C again at Syowa Station (planned January 2007). The tube in the Cs frequency comparator has to be changed, and the down-converter/local oscillator has to be replaced with a new one in the near future.

3. Session Status

Table 1 summarizes status of processing as of January 2006 for the sessions after 2002. The SYW sessions 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 and participated in six OHIG sessions and two CRD sessions.

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.

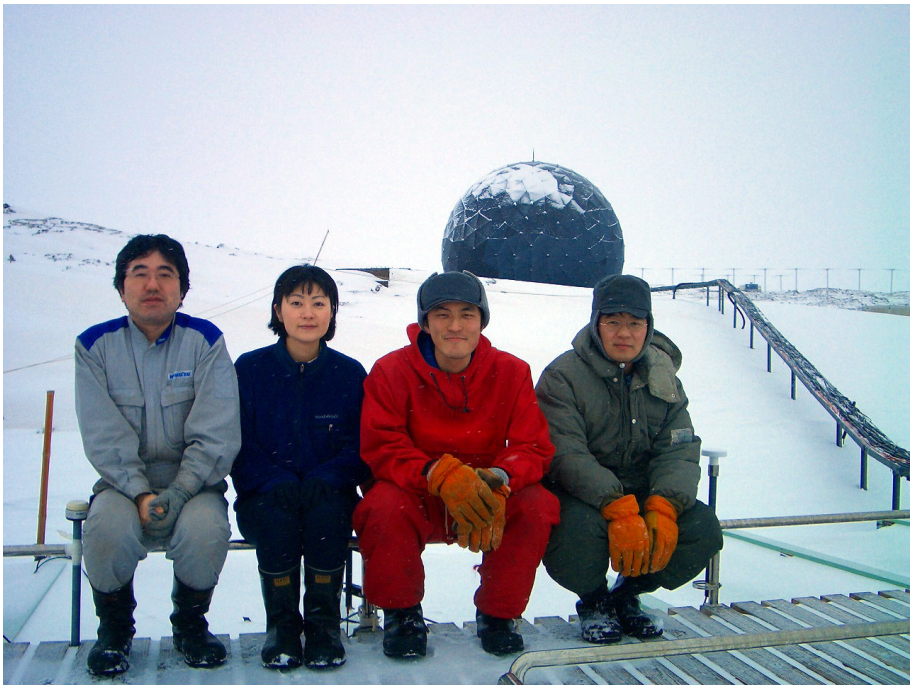

Figure 1. Syowa VLBI staff for JARE-46 (Feb. 2005 - Jan. 2006) in front of the VLBI antenna radome.

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

- Kazuo Shibuya, Project coordinator at NIPR.
- Koichiro Doi, Liaison officer at NIPR.
- Koichiro Doi (from NIPR), Chief operator for JARE-45 (Feb. 2004 - Jan. 2005).
- Kazuo Fukuhara (from NEC), Antenna engineer for JARE-45.
- Kuniko Egawa (from Japan Hydrographic Association), Chief operator for JARE-46 (Feb. 2005 - Jan. 2006). (second left in Figure 1)
- Isao Okabayashi (from NEC), Antenna engineer for JARE-46. (far left in Figure 1)
- Shin'ya Sakanaka (from Akita University), Operator for JARE-46. (far right in Figure 1)
- Takeshi Uemura (from NIPR), Operator for JARE-46. (second right in Figure 1)

Table 1. Status of SYW and OHIG experiments as of January 2006

Code	Date	Station	Hour	Correlation	Solution	Notes
OHIG19	2002/Feb/11	Ho, Hh, Ft, Oh, Kk	24 h	Yes	Yes	(J43)
SYW022	2002/Apr/29	Ho, Hh	24 h	Yes	Yes	
SYW023	2002/Aug/12	Ho, Hh	24 h	Yes	Yes	
SYW024	2002/Nov/04	Ho, Hh	24 h	Yes	Yes	
OHIG20	2002/Nov/12	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
OHIG22	2002/Nov/20	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Yes	Yes	
SYW025	2003/Jan/16	Ho, Hh	24 h	Not yet	Not yet	
OHIG23	2003/Jan/20	Ho, Hh, Ft, Oh, Tc	24 h	Yes	Yes	
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	Not yet	Not yet	
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/16	Ho, Hh, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	
OHIG33	2004/Nov/09	Ho, Ft, Oh, Kk, Tc	24 h	Not yet	Not yet	
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	Not yet	Not yet	
SYW032	2004/Dec/13	Ho, Hh	24 h	Yes	Yes	
OHIG36	2005/Jan/26	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	
OHIG37	2005/Feb/02	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	(J46)
OHIG38	2005/Feb/15	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	
CRDS18	2005/Apr/11	Ho, Hh	24 h	Not yet	Not yet	
CRDS19	2005/May/10	45, Hh	24 h	Not yet	Not yet	
OHIG39	2005/Nov/08	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	
OHIG40	2005/Nov/09	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	
OHIG41	2005/Nov/16	Ho, Hh, Ft, Oh, Kk	24 h	Not yet	Not yet	

(1) 45: DSS45
(J43) JARE-43: op K. Sakura eng M. Abe (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

5. Analysis Results

Until the end of 2005, 42 sessions from May 1999 to November 2004 have been analyzed with the software CALC/SOLVE developed by NASA/GSFC. The data of 6 sessions by JARE-46 (4 OHIG and 2 CRD) are not returned yet.

The length of the Syowa-Hobart baseline is increasing with a rate of 54.4 ± 0.9 mm/yr. The Syowa-HartRAO baseline shows slight increase with a rate of 11.1 ± 0.7 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.