

# KSP-VLBI Correlation Center Report

*Mamoru Sekido, Jun Amagai, Hitoshi Kiuchi, Yasuhiro Koyama*

## Abstract

Communications Research Laboratory has been regularly operating Key Stone Project (KSP) VLBI experiments to monitor crustal deformation around the Tokyo metropolitan area. Real-time VLBI system was mainly used for the routine VLBI experiments and the project was closed at the end of November 2001. Tape-based KSP VLBI correlation system was moved to Kashima Space Research center in April. Optically linked real-time VLBI experiment with Usuda 64m antenna and Kashima 34m antenna was also performed several times.

## 1. Introduction

Real-time geodetic VLBI observations have routinely been operated in Key Stone Project (KSP) to monitor crustal deformation around metropolitan area around Tokyo in Japan [1]. The KSP correlation center is located in Koganei city in Tokyo and has two kinds of VLBI correlation systems, which are real-time VLBI system ([2]-[4]) with optical fiber communication (ATM) link and tape-based system ([5],[6]) by using magnetic tapes as data recording media. Both correlators are XF-type correlation systems with 4-stations and 6-baselines correlation processing capability. The real-time VLBI system had been operated routinely every other day with three stations (Kashima, Koganei, and Tateyama) [7]. The tape-based VLBI system has been operated several times in a year mostly for domestic geodetic-frame-tie experiments.

## 2. Real-Time VLBI correlation System

Real-time VLBI correlation system was constantly operated every other day with three stations till to the end of June. Then VLBI experiment schedule was changed to operation every other day except for Saturday and Sunday, since duty of operation staff was reduced. On November 30 in 2001, KSP VLBI system has closed its mission. Also, this real-time VLBI system was sometimes used for optically linked VLBI experiments with Kashima 34m antenna (CRL) and Usuda 64m antenna (ISAS) [7].

## 3. Tape-Based VLBI Correlation System

Tape-based VLBI correlation system has been mainly used for domestic VLBI campaign, named JPNTI experiments. The JPNTI experiments were organized under the collaboration with Geographical Survey Institute (GSI) with KSP three 11 m antennas, Kashima 34 m antenna, 26 m antenna and Tsukuba 32 m antenna. Since KSP correlation system is able to process the data of six baselines among four VLBI stations simultaneously, correlation processing of VLBI data including more than 4 stations needs a few times of re-processing with difference combination of stations. Whole processing of JPNTI6 and half of JPNTI7 was done at Koganei KSP correlation center in Tokyo in the first quoter of 2001. Then, the tape-based correlation system was disassembled and transfered to Kashima Space Research Center in April. The system was set up in a new circumstance (Figure 1) and JPNTI7 experiment and HOKT experiment was processed.



Figure 1. KSP tape-based correlation system placed at Kashima Space Research Center

HOKT is a name of VLBI campaign to determine station coordinates of Tomakomai 11 m antenna in Hokkaido-island, which was move from Miura station of KSP.

#### 4. Staff

- Tetsuro Kondo: Responsible for overall operations and performance.
- Taizoh Yoshino: Leader of the Key Stone Project team in CRL.
- Hitoshi Kiuchi: Developments of correlation system and real-time VLBI interfaces.
- Jun Amagai: Responsible for operation of KSP at Koganei control center.
- Yasuhiro Koyama: Responsible for automatic database creation and analysis system in KSP VLBI system.
- Mamoru Sekido, Eiji Kawai Eiji, and Hiroshi Okubo, Responsible for correlation processing at Kashima Space Research Center.
- Naoki Goto, Muneo Takeda, and Hiroyuki Shibata of Space Engineering Development Co., Ltd. operated KSP-VLBI system until June 2001 at the correlation center in Koganei (Tokyo).

#### References

- [1] Taizoh Yoshino: Overview of the Key Stone Project, J. Commun. Res. Lab., Vol. 46, No. 1, pp.3-6, March 1999
- [2] H.Kiuchi, M.Imae, T.Kondo, M.Sekido, S.Hama, T.Hoshino, H.Uose, and T.Yamamoto,"Real-time VLBI system using ATM network", IEEE-TGRS, Vol.38, No.3,pp.1290-1297, May 2000.
- [3] Hitoshi Kiuchi, Tetsuro Kondo, Mamoru Sekido, Yasuhiro Koyama, Michito Imae, Takashi Hoshino, and Hisao Uose: KSP VLBI System; Real-Time VLBI Data Transfer and Correlation System, J. Commun. Res. Lab., Vol. 46, No. 1, pp.83-89, March 1999
- [4] Mamoru Sekido, Tetsuro Kondo, and Hitoshi Kiuchi: KSP VLBI System; Real-Time Correlation Processing Control Software, J. Commun. Res. Lab., Vol. 46, No. 1, pp.91-96, March 1999
- [5] Hitoshi Kiuchi, Tetsuro Kondo, and Mamoru Sekido: KSP VLBI System; Correlation Processing System, J. Commun. Res. Lab., Vol. 46, No. 1, pp.47-53, March 1999

- [6] Mamoru Sekido, Hitoshi Kiuchi, and Tetsuro Kondo: KSP VLBI System; Correlation Processing Software, J. Commun. Res. Lab., Vol. 46, No. 1, pp.55-66, March 1999
- [7] Mamoru Sekido, Hitoshi Kiuchi, and Yasuhiro Koyama: KSP-VLBI Correlation Center Report, IVS Annual report 2000, edited by N. R. Vandenberg and K. D. Baver, NASA/TP-2002-210001, 2000.