

# Data Center at NICT

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## Abstract

The Data Center at the National Institute of Information and Communications Technology (NICT) archives and releases the databases and analysis results processed at the Correlator and the Analysis Center at NICT. Regular VLBI sessions of the Key Stone Project VLBI Network were the primary objective of the Data Center. These regular sessions continued until the end of November 2001. In addition to the Key Stone Project VLBI sessions, NICT has been conducting geodetic VLBI sessions for various purposes, and these data are also archived and released by the Data Center.

## 1. Introduction

The IVS Data Center at National Institute of Information and Communications Technology (NICT) archives and releases the databases and analysis results processed by the Correlator and the Analysis Center at NICT. Major parts of the data are from the Key Stone Project (KSP) VLBI sessions [1], but other regional and international VLBI sessions conducted by NICT are also archived and released. Because routine observations of the KSP network terminated at the end of November 2001, there have been no additional data from the KSP regular sessions since 2002.

On March 11, 2011, the devastating megaquake ( $M_w$  9.0) hit our antennas. The azimuth track and one azimuth wheel of the Kashima 34-m were damaged as a consequence of the megaquake. Since the antenna is still under repair, there are no VLBI databases containing baselines with the 34-m antenna in 2012. On the other hand, the 11-m antennas at Kashima and Koganei were not damaged by the earthquake. We have carried out 39 VLBI experiments using the 11-m antennas including time and frequency transfer experiments, international and domestic geodetic experiments, and astrophysical experiments.

The analysis results in SINEX (Solution INdependent EXchange) format, as well as in other formats, are available on the WWW server. Database files of non-KSP sessions, i.e. other domestic and international geodetic VLBI sessions, are also available on the WWW server. Table 1 lists the WWW server locations maintained by the NICT Data Center. In the past, an FTP server was used to provide data files, but it was decided to terminate the FTP service because of the security risks of maintaining an anonymous FTP server. Instead, the [www3.nict.go.jp](http://www3.nict.go.jp) WWW server was prepared to provide large size data files.

Table 1. URL of the WWW server systems.

Service	URL
KSP WWW pages	<a href="http://ksp.nict.go.jp/">http://ksp.nict.go.jp/</a>
IVS WWW mirroring	<a href="http://ivs.nict.go.jp/mirror/">http://ivs.nict.go.jp/mirror/</a>
Database files	<a href="http://www3.nict.go.jp/aeri/sts/stmg/database/">http://www3.nict.go.jp/aeri/sts/stmg/database/</a>
e-VLBI Sessions	<a href="http://www2.nict.go.jp/aeri/sts/stmg/research/e-VLBI/UT1/">http://www2.nict.go.jp/aeri/sts/stmg/research/e-VLBI/UT1/</a>
Hayabusa Sessions	<a href="http://www2.nict.go.jp/aeri/sts/stmg/research/Navi/HAYABUSA/">http://www2.nict.go.jp/aeri/sts/stmg/research/Navi/HAYABUSA/</a>

The responsibility for the maintenance of these server machines was moved from the VLBI research group in 2001 to a common division which handles all institutional network service for the laboratory in order to improve the network security of these systems.

## 2. Data Products

### 2.1. KSP VLBI Sessions

The KSP VLBI sessions were performed with four KSP IVS Network Stations at Kashima, Koganei, Miura, and Tateyama on a daily or bi-daily basis until May 1999. The high-speed ATM (Asynchronous Transfer Mode) network line to the Miura station became unavailable in May 1999, and real-time VLBI observations with the Miura station became impossible. Thereafter, the real-time VLBI sessions were performed with the three other stations. Once every six days (every third session), the observed data were recorded to the K4 data recorders at three stations, and the Miura station participated in the sessions with the tape-based VLBI technique. In this case, the observed data at the three stations other than the Miura station were processed in real-time, and the analysis results were released promptly after the observations completed. A day later, the observed tapes were transported from the Kashima, Miura, and Tateyama stations to the Koganei station for tape-based correlation processing with all six baselines. After the tape-based correlation processing was completed, the data set produced with the real-time VLBI data processing was replaced by the new data set.

In July 2000, unusual site motion of the Tateyama station was detected from the KSP VLBI data series, and the frequency of the sessions was increased from bi-daily to daily on July 22, 2000. The daily sessions were continued until November 11, 2000, and the site motions of the Tateyama and Miura stations were monitored in detail. During the period, it was found that Tateyama station moved about 5 cm in the northeast direction. The Miura station also moved about 3 cm to the north. The unusual site motions of these two stations gradually settled, and the current site velocities seem to be almost the same as the site velocities before June 2000. By investigating the time series of the site positions, the unusual site motion started sometime between the end of June 2000 and the beginning of July 2000. At the same time, volcanic and seismic activities near the Miyakejima and Kozushima Islands began. These activities are believed to have caused the regional crustal deformation in the area, explaining the unusual site motions at Tateyama and Miura.

### 2.2. Other VLBI Sessions

In recent years, we have carried out time and frequency transfer experiments using VLBI. In addition, domestic and international geodetic and astronomical VLBI sessions were conducted by NICT in cooperation with the Geospatial Information Authority of Japan (GSI), the National Astronomical Observatory of Japan (NAO), and other organizations. These sessions are listed in Table 2. The recently observed data from these sessions were mainly processed by the K5 software correlator at NICT either at Koganei or at Kashima or by using a real-time hardware correlator developed by NAO.

In 2012, we have no data using the 34-m antenna since the antenna has been under repair to recover from the damages due to the earthquake. The repair will be finished at the end of March 2013.

Table 2. VLBI sessions conducted by NICT (since 2005). \*In 2012, all experiments were observed using the 11-m antennas at Kashima and Koganei because the 34-m antenna was under repair to recover from the earthquake damage.

Year	exp. names	sessions
2005	Geodetic	c0505 (CONT05, partial participation),
	Hayabusa	GEX13, 14 sessions
2006	Geodetic	GEX14, viepr2, CARAVAN (3 sessions)
	Spacecraft	Geotail : 1 session
	Pulsar	1 session
2007	Ultra Rapid e-VLBI	15 times, 29 sessions
	Time Transfer	4 sessions, 12 days in total
	Cs-Gas-Cell	1 session
	Spacecraft	Hayabusa : 1 session
2008	Ultra Rapid e-VLBI	8 times, 33 sessions
	Time Transfer	26 sessions
	Variable Star e-VLBI	31 sessions
2009	e-VLBI	15 sessions, 90.5 hours in total
	IVS	12 sessions, 332 hours in total
	Time Transfer	9 sessions, 72 hours in total
	VERA	16 sessions, 149 hours in total
	Survey	26 sessions, 276 hours in total
2010	IVS	38 sessions, 442 hours in total
	Radio astronomy	34 sessions, 324 hours in total
	Spacecraft (IKAROS, UNITEC-1, QZSS)	33 sessions, 259 hours in total
	Domestic geodetic	13 sessions, 94 hours in total
	Time Transfer	9 sessions, 86 hours in total
	e-VLBI	9 sessions, 27 hours in total
2011	IVS	two sessions, 48 hours in total
	Radio astronomy	100 hours in total
	earthquake damage investigation	216 hours in total
2012*	IVS	9 sessions, 216 hours in total
	Radio astronomy (Sgr-A*)	13 sessions, 28 hours in total
	Domestic geodetic	3 sessions, 72 hours in total
	International fringe test (New Zealand and Korea)	2 sessions, 16 hours in total
	International geodetic (New Zealand)	1 session, 24 hours in total
	Time transfer	11 sessions, 264 hours in total

### 3. Staff Members

The Data Center at NICT is operated and maintained by the Space-Time Standards Group at the Kashima Space Research Center, NICT. The staff members are listed in Table 3.

Table 3. Staff members of the Space-Time Measurements Group, NICT. †Ichikawa moved to the Koganei division of the NICT on May 1, 2012.

Name	Main Responsibilities
ICHIKAWA Ryuichi†	Frequency and Time Transfer using compact VLBI system
SEKIDO Mamoru	Responsible for e-VLBI sessions
HASEGAWA Shingo	System Engineer

#### 4. Future Plans

The IVS Data Center at NICT will continue its service and will archive and release the analysis results accumulated by the Correlator and the Analysis Center at NICT. In addition, a number of VLBI sessions will be conducted for the purposes of various technology developments.

#### References

- [1] Special issue for the Key Stone Project, J. Commun. Res. Lab., Vol. 46, No. 1, March 1999.