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 General Information

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. The antenna repair had already been finished in March 2013. On the other hand, the 11-m antennas at Kashima and Koganei were not damaged by the earthquake. We have observed 20 VLBI experiments using the 11-m antennas including time and frequency transfer experiments, international and domestic geodetic experiments, and astronomical experiments during the repair of the 34-m antenna.

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 WWW server was prepared to provide large size data files.

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 of the laboratory in order to improve the network security of these systems.

2 Activities during the Past Year

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

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Table 1 URL of the WWW server systems.

Service	URL
KSP WWW pages	`http://ksp.nict.go.jp/`
IVS WWW mirror pages	`http://ivs.nict.go.jp/mirror/`
Database files	`http://www3.nict.go.jp/aeri/sts/stmg/database/`
e-VLBI Sessions	`http://www2.nict.go.jp/aeri/sts/stmg/research/e-VLBI/UT1/`

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 the Tateyama station moved approximately 5 cm to the northeast direction. The Miura station also moved approximately 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. According to the investigations of 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 (NAO), and other organizations. These sessions are listed in Table 2. The recent observed data of 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.

3 Current Status

The repair of the Kashima 34-m antenna was finished in March 2013. In 2014, the Kashima 34-m and 11-m antennas participated in various experiments. Especially, we have concentrated our effort on testing for developments of broadband receiving systems.

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.

Table 2 VLBI sessions conducted by NICT (since 2005). In 2012, all experiments were observed using 11-m antennas at Kashima and Koganei because the 34-m antenna was under repair to recover from the earthquake damage. At the end of March 2013, the repair of the 34-m antenna was finished.

Year	exp. names	sessions
2005	Geodetic	c0505 (CONT05, partial participation), GEX13
	Hayabusa	14 sessions
2006	Geodetic	GEX14, viepr2, CARAVAN (three sessions)
	Spacecraft	Geotail: one session
	Pulsar	one session
2007	Ultra Rapid e-VLBI	15 times, 29 sessions
	Time Transfer	four sessions, 12 days in total
	Cs-Gas-Cell	one session
	Spacecraft	Hayabusa: one session
2008	Ultra Rapid e-VLBI	eight 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	nine 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	nine sessions, 86 hours in total
	e-VLBI	nine 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	nine sessions, 216 hours in total
	Radio astronomy (Sgr-A*)	13 sessions, 28 hours in total
	Domestic geodetic	three sessions, 72 hours in total
	International fringe test (New Zealand and Korea)	two sessions, 16 hours in total
	International geodetic (New Zealand)	one session, 24 hours in total
	Time transfer	11 sessions, 264 hours in total
2013	IVS	five sessions, 120 hours in total
	Radio astronomy (including Sgr-A* obs.)	71 sessions, 266 hours in total
	Domestic geodetic	14 sessions, 213 hours in total
	Time transfer	two sessions, 46 hours in total
	International fringe test (New Zealand and Korea)	two sessions, 16 hours in total
	Pulsar	39 sessions, 274 hours in total
2014	IVS	13 sessions, 332 hours in total
	Radio astronomy (including Sgr-A* obs.)	95 sessions, 632 hours in total
	Domestic geodetic	five sessions, 130 hours in total
	Time transfer	five sessions, 288 hours in total
	Pulsar	three sessions, 24.5 hours in total