Nanshan IVS Biennial Report for 2015 and 2016

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Abstract This report briefly introduces general information about the newly upgraded NanShan Radio Telescope (NSRT), the status of the VLBI backend, and the staff involved in VLBI activities. The report also summarizes the IVS observations with NSRT during 2015 and 2016.

1 General Information

The NanShan Radio Telescope (NSRT) is located in the Eurasia hinterland (about 70 km south of Urumqi) and is operated by the Xinjiang Astronomical Observatory (XAO), at the Chinese Academy of Sciences (CAS). After its active service for about 20 years, the NSRT received an overall upgrade, including the primary/secondary reflectors, the receiver cabin, the Azimuth track, and so on. The NSRT reconstruction project started in early 2014 and finally finished in late 2015. The new telescope aperture is now 26 meters, one meter larger than the old one. The NSRT is currently equipped with L-, S/X-, C-, and K-band receivers and a Q-band receiver is on the way. Figure 1 shows the new NSRT, and Table 1 lists the main properties of the antenna. In late 2015, the antenna parameters were measured systematically to involve the telescope in scientific observing as soon as possible. During 2016, the telescope participated in most of the EVN and IVS experiments and some of the EAVN commissioning, as well as in single-dish observations.

Xinjiang Astronomical Observatory (XAO), CAS

XAO-Nanshan Network Station

Fig. 1 The new NanShan 26-m Radio Telescope (NSRT).

2 Upgrades of VLBI Backend Systems

In late 2016, the DBBC2 was set up (see Figure 2) and employed in test observations. The clear fringes and good SNRs of the commissioning observations suggest that the upgrade of the digital VLBI backend has been successful at the Nanshan Station. The DBBC2+Mark5B, as the main VLBI backend system of NSRT, will be involved in the formal IVS observations and other VLBI sessions in 2017. The Field

Table 1 The properties of new NSRT.

Telescope Name	NanShan Radio Telescope (NSRT)
Coordinates	87°10.67′ E, +43°28.27′ N
Antenna Mount	Azimuthal (El. Over Az.)
Telescope type	Shaped Cass.
Diameter of main reflector	26 m
Diameter of sub-reflector	3 m
Seat-rack type	Azimuth-pitching ring
Surface accuracy	0.4 mm (rms)
Pointing precision	10″(rms)
Receivers for Geodetic obs.	3.6 cm/13 cm

System was upgraded to version FS-9.11.8 and the Mark5B/B+ software up to SDK9.4.0, and the program Jive5ab was installed at the end of 2016. In addition, we purchased a set of RDBE and Mark 6 devices, which are still in testing, to be used for future observations.

3 Staff

The staff at Nanshan Station consists of about 20 people, including telescope operators; technical personnel for receivers, electronics, and mechanics; scientists, and administrative personnel. In Table 2, we list the persons involved in VLBI activities.

Table 2 Staff related to VLBI activities currently at Nanshan Station.

Name	Function	Contact
Lang Cui	VLBI friend/support scientist	cuilang@xao.ac.cn
Wenjun Yang	VLBI duty engineer/operator	yangwj@xao.ac.cn
Hua Zhang	VLBI duty engineer/operator	zhangh@xao.ac.cn
Peng Li	VLBI operator	lipeng@xao.ac.cn
Guanghui Li	VLBI operator	ligh@xao.ac.cn
Xiang Liu	VLBI support scientist	liux@xao.ac.cn

4 Geodetic VLBI Observations

In total, the NSRT participated in 32 24-hour regular IVS sessions during the years 2015 and 2016, as well

Fig. 2 The mounted DBBC2 at Nanshan station.

as the EVN, Eastern Asia VLBI Network (EAVN), and Chinese VLBI Network (CVN) observations. The detailed information of IVS sessions including NSRT is listed in Table 3.

Acknowledgements

Table 3 IVS observations at Nanshan Station during 2015 and 2016.

No.	epoch	code	obs.time	quality	Rate(Mbps)	format
1	2015-024 UT18:30	R4673	24	—	—	—
2	2015-080 UT00:30	Aov001	24	0%	128	MK5B
3	2015-085 UT18:30	R4680	24	0%	128	MK5B
4	2015-244 UT17:30	Apsg36	24	—	—	—
5	2015-246 UT18:30	R4703	24	—	—	—
6	2015-269 UT00:00	Aov005	24	—	—	—
7	2015-314 UT17:30	T2107	24	99.2%	128	MK5B
8	2015-342 UT17:30	Apsg37	24	99.3%	128	MK5B
9	2015-350 UT18:00	Aov006	24	0%	128	MK5B
10	2015-356 UT17:00	R4719	24	97.2%	128	MK5B
11	2016-007 UT18:30	R4721	0	0%	128	MK5B
12	2016-011 UT06:30	Aug020	0	0%	128	MK5B
13	2016-033 UT17:30	Aov007	24	99.9%	128	MK5B
14	2016-035 UT18:30	R4725	24	NOT CORR	128	MK5B
15	2016-076 UT18:00	Aov008	24	99.8%	128	MK5B
16	2016-077 UT18:30	R4731	24	98.8%	128	MK5B
17	2016-083 UT18:30	R4732	24	97.9%	128	MK5B
18	2016-132 UT17:00	Aov009	24	98.3%	128	MK5B
19	2016-173 UT17:30	T2111	24	96.1%	128	MK5B
20	2016-189 UT18:30	R4747	24	NOT CORR	128	MK5B
21	2016-194 UT17:30	Aua011	24	NOT USED	128	MK5B
22	2016-196 UT18:30	R4748	24	72%	128	MK5B
23	2016-208 UT17:30	Apsg38	24	98.7%	128	MK5B
24	2016-209 UT18:00	Aov010	24	98.5%	128	MK5B
25	2016-222 UT17:30	Aua012	24	99.7%	128	MK5B
26	2016-238 UT18:30	R4754	24	99.8%	128	MK5B
27	2016-264 UT17:00	Aov011	24	NOT USED	128	MK5B
28	2016-272 UT18:00	Apsg39	24	98.9%	128	MK5B
29	2016-286 UT17:30	Aov012	24	NOT CORR	128	MK5B
30	2016-320 UT17:30	T2114	24	??%	128	MK5B
31	2016-336 UT18:30	R4768	24	NOT CORR	128	MK5B
32	2016-354 UT16:30	Rd1613	24	??%	128	MK5B