

# Urumqi Station Status Report for 2021–2022

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**Abstract** The Urumqi Nanshan station is operated by the Xinjiang Astronomical Observatory of the Chinese Academy of Sciences. This report summarizes the current characteristics, activities, and technical developments of the VLBI station facilities in 2021 and 2022.

base in the summer of 2022. All the digital facilities originally working in the observation room were dismantled and moved into the new shielding box. All the facilities are now completely remounted and working normally in the shielding box (Figure 3). The shielding effectiveness of the box is being evaluated in detail.

## 1 Technical Developments

In the past two years, three new wideband receivers working at Q-band, C-band, and L-band, respectively, were designed and implemented by the engineer team and have been equipped chronologically in the radio cabin of the Nanshan 26-m Radio Telescope (NSRT). The new Q-band receiver, covering frequencies of 30–50 GHz, joined fringe test observations with the EVN and EAVN from late 2021 and got fringes successfully (Figure 1). Meanwhile, the new C-band receiver, covering frequencies of 4–8 GHz, also joined fringe test observations with the EAVN and successfully got 6.7 GHz maser fringes. It is expected that the new Q- and C-band receivers could formally service the VLBI community from late 2023. The new L-band receiver, covering frequencies of 1–2 GHz, was just installed on the telescope in late 2022 (Figure 2) and now is conducting single-dish commissioning observations.

In addition, in order to mitigate the RFI mainly generated by on-site digital facilities, a walk-in electromagnetic shielding box was built under the telescope

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XAO-Nanshan Network Station (Ur)

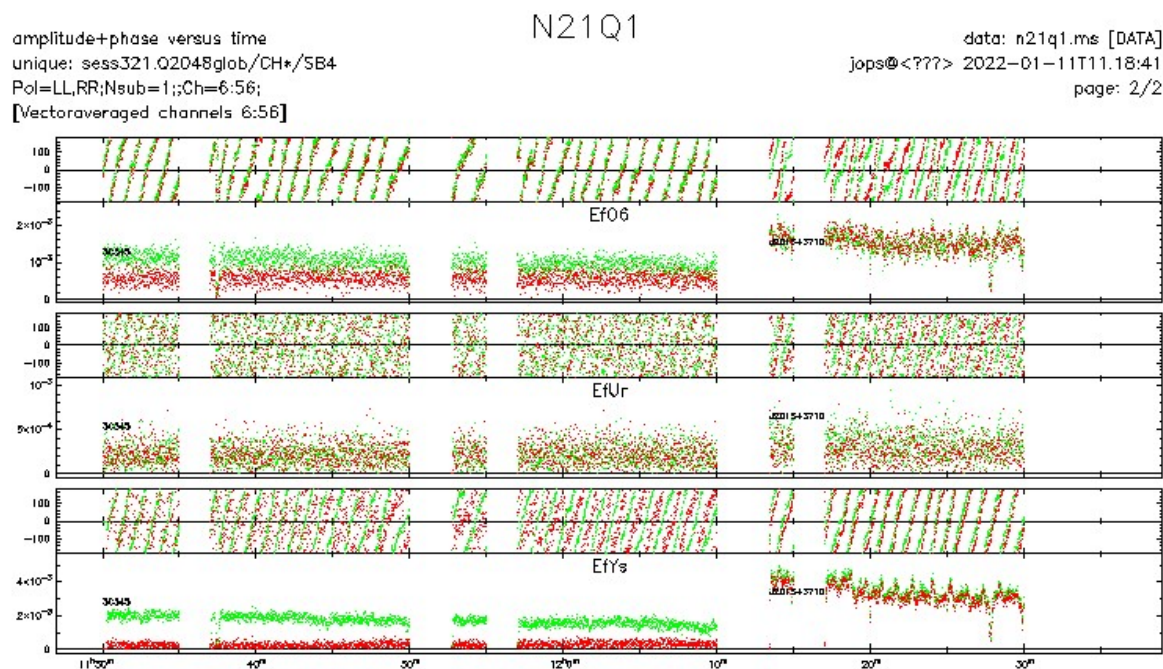
IVS 2021+2022 Biennial Report

## 2 VLBI Terminal Status

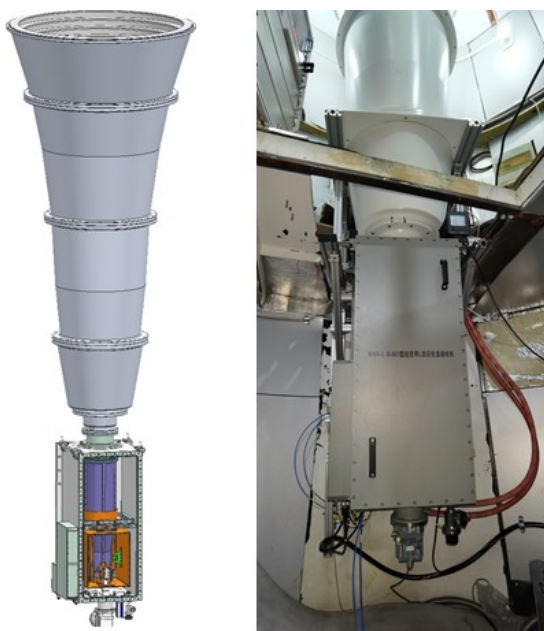
Currently, the VLBI terminal system at Nanshan station consists of one DBBC2, one MK5B+, one MK6, one Flexbuff, and four CDAS2s. Among them, the DBBC2 and MK5B+ are mainly used for 2 Gbps international joint observations of EVN, IVS, EAVN, etc. The CDAS2 is mainly employed in Chinese VLBI observations serving for space missions. The MK6 and Flexbuff are now under on-site testing, and newly purchased DBBC3s have arrived at Nanshan station too. In addition, we are planning to purchase another three MK6s in 2023. Based on these new terminal devices, it is expected that the Nanshan station (Ur) will be able to join normally 4 Gbps VLBI observations by the end of 2023.

## 3 Scheduled VLBI Observations

In 2021, there were 487 VLBI experiments conducted by the NSRT serving under the EVN, IVS, and EAVN networks, as well as domestic joint observations for space missions, with a total effective observing time of about 2,578 hours. Among these observations, there were 105 EVN runs with the total time of about 712



**Fig. 1** The cross correlation amplitude and phase between Ef and Ur at 43 GHz, shown in the middle panel.



**Fig. 2** The simulated picture and installation status of the new L-band receiver.

hours, including 215 hours for the EVN-FRB program. In 2022, 276 VLBI experiments were conducted for all the VLBI networks mentioned above, and the total ef-



**Fig. 3** The digital backend systems for VLBI and single dish operations, working in the walk-in electromagnetic shielding box under the telescope base.

fective observing time is about 1,674 hours, of which about one half were spent serving for EVN regular observations and EVN-FRB runs.

The IVS sessions conducted by the Nanshan Station in 2021–2022 are shown in Table 1. Among them, 17 sessions were scheduled for 2021, 13 sessions were completed, and the effective observing time was about 258 hours. The unexecuted sessions are mainly due to

**Table 1** IVS session statistics in 2021–2022.

No.	Observation epoch	Experiment code	Duration (hours)	Data rate (Mbps)	Data format
1	2021-007 UT18:30	R4980	Not executed	128	MK5B+
2	2021-081 UT16:30	AOV057	19	128	MK5B+
3	2021-117 UT17:30	AOV058	21	128	MK5B+
4	2021-144 UT13:00	CRF124	Not executed	128	MK5B+
5	2021-153 UT17:30	AOV060	Not executed	128	MK5B+
6	2021-180 UT17:30	CRF125	13	128	MK5B+
7	2021-189 UT18:30	R41006	24	128	MK5B+
8	2021-201 UT17:30	APSG48	21	128	MK5B+
9	2021-236 UT17:30	AOV062	24	128	MK5B+
10	2021-238 UT18:30	R41013	17	128	MK5B+
11	2021-252 UT18:30	R41015	14	128	MK5B+
12	2021-272 UT18:00	APSG49	24	128	MK5B+
13	2021-287 UT18:30	R41020	16	128	MK5B+
14	2021-320 UT17:30	AOV065	24	128	MK5B+
15	2021-321 UT18:00	CRF127	20	128	MK5B+
16	2021-322 UT18:30	R41025	21	128	MK5B+
17	2021-356 UT18:30	R41030	Not executed	128	MK5B+
1	2022-027 UT18:30	R41035	24	128	MK5B+
2	2022-048 UT18:30	R41038	24	128	MK5B+
3	2022-054 UT18:00	AOV068	24	128	MK5B+
4	2022-089 UT18:00	CRF130	24	128	MK5B+
5	2022-111 UT18:30	R41047	24	128	MK5B+
6	2022-116 UT17:30	AOV070	24	128	MK5B+
7	2022-173 UT18:00	CRF131	24	128	MK5B+
8	2022-188 UT19:00	APSG50	24	128	MK5B+
9	2022-209 UT18:30	R41061	Not executed	128	MK5B+
10	2022-216 UT19:00	AOV074	Not executed	128	MK5B+
11	2022-241 UT18:30	R41065	Not executed	128	MK5B+
12	2022-251 UT18:30	R41067	Not executed	128	MK5B+
13	2022-265 UT18:30	R41069	24 (diskpack not delivered)	128	MK5B+
14	2022-327 UT18:00	CRF133	24	128	MK5B+
15	2022-349 UT19:00	AOV078	24	128	MK5B+
16	2022-354 UT17:30	APSG51	24	128	MK5B+

**Table 2** The new VLBI operation team at Ur.

Name	Position	E-mail
Hua Zhang	VLBI friend & terminal engineer	zhangh@xao.ac.cn
Hao Yan	Technical friend & receiver engineer	yanhao@xao.ac.cn
Guanghui Li	VLBI terminal engineer	ligh@xao.ac.cn
Jianping Yuan	TAC reader & scheduler	yuanjp@xao.ac.cn
Lang Cui	Head of Nanshan station & VLBI chief	cuilang@xao.ac.cn

schedule conflicts with our domestic observing missions. In 2022, 16 sessions were scheduled and 12 sessions were completed, with an effective observing time of about 288 hours. The unexecuted sessions were mainly due to the relocation of the observation equipment delayed by COVID.

#### 4 Personnel Update

The VLBI operation team of Ur was updated in May 2022. The new personnel allocations are listed in Table. 2.