

Nanshan VLBI Station Report 2014

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Abstract The Nanshan VLBI station was upgraded significantly during 2014. A lot of technical work still needs to be done in 2015, although it is already back online for IVS observations.

1 General Information



Fig. 1 The dismantling of the 25-m dish in April.

Built in 1997, the Nanshan 25-m telescope has reached its design life. It has been under reconstruction since 20 March 2014. The climate-restricted construction period on the mountain plateau of Tianshan is only about a half year, so the reconstruction comes in two stages. At stage I, all parts above the elevation wheel will be

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Fig. 2 The aura of the rebuilt 26-m dish in November.

rebuilt this year; at stage II, the lower parts will be refurbished, including adjustment of the azimuthal track next year. The alidade and all the receivers and terminals remain the same. We expect a significant improvement of the reflector's surface accuracy after the reconstruction, so in the feed cabin we have reserved a room for a future 7-mm receiver. The second focal room is designed to be fitted with fixed multi-band feeds and a movable sub-reflector. To fully utilize the height of the elevation bearing, as well as to compensate for the new big feed hole, we will increase the antenna diameter to 26 m. Stage I is planned to be finished before this October in order to serve the coming lunar exploration mission.

2 Activities during the Past Year

Because the major restoration work is being carried out this year, many VLBI observations are being hindered. We joined few EAVN and EVN observations be-

fore the dismantling of the old 25-m telescope. We also joined IVS observing soon after the restoration of the new 26-m telescope. But because many antenna parameters need to be re-measured, we haven't started VLBI observations for astrophysical purposes as EVN and EAVN have required. But we have managed to observe ten scheduled IVS sessions outside the reconstruction time range in 2014.

Table 1 The observed IVS sessions.

Session	Date	Remarks
R4618	JAN 02	Normal
R1621	JAN 21	Normal
T2095	FEB 18	Normal
RD1407	SEP 10	Normal
RD1409	OCT 07	Normal
RD1411	NOV 04	Normal
R1661	NOV 10	Normal
APSG35	DEC 08	Normal
R4665	DEC 11	Normal
R4668	DEC 30	Normal

3 Current Status

3.1 Antenna Restoration

The newly built 26-m dish has made its debut in IVS observing, but time is still needed to completely restore this antenna and to make known its capabilities to the astronomical community. Currently only S/X and L bands are restored at a workable level. The new station center needs to be calculated from recent IVS observations. The antenna parameters such as pointing, gain curve, and beam map also need to be re-measured.

3.2 Backend and Recording System

Bundled with antenna upgrading, an RDBE is planned to be purchased this year. A DBBC and Mark 5b+ and Mark 6 will be purchased later on. The restored system with the new antenna will have separate VLBI terminals for EVN besides the CVN one which allows more remote accessibility. The Streamstor SDK for Mark 5

will be upgraded to version 9.2, and the FS will be upgraded to version 9.11.4 before joining the next EVN session.

4 Future Plans

There is a program in progress to build a fully steerable 110-m radio telescope (QTT) in Qitai county which is about 200 km east to Urumqi. Being less heavily engaged with astrophysical observations, Nanshan 26-m antenna could be a specialized VLBI telescope in the future. But the 26-m telescope will be a preliminary experiment platform for new techniques such as ultra-wideband digital receivers, which will be incorporated in accordance with the new VGOS goals. There are also plans to build dedicated VGOS antennas nearby.