Shanghai Station Report for 2015–2016

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Abstract This report summarizes the observing activities at the Sheshan station (SESHAN25) and the Tianma station (TIANMA65) in 2015 and 2016. It includes the international VLBI observations for astrometry, geodesy, and astrophysics and domestic observations for satellite tracking. We also report on updates and development of the facilities at the two stations.

1 General Information

The Sheshan station ('SESHAN25') is located at Sheshan, 30 km west of Shanghai. It is hosted by Shanghai Astronomical Observatory (SHAO), at the Chinese Academy of Sciences (CAS). The 25-meter radio telescope is in operation at 3.6/13, 5, 6, and 18 cm wavelengths. The Sheshan VLBI station is a member of the IVS and EVN. The Tianma station ('TIANMA65') is located in the western suburbs of Shanghai, Sheshan town, Songjiang district. It is jointly funded by the Chinese Academy of Sciences (CAS), Shanghai Municipality, and the Chinese Lunar Exploration Program. The telescope construction started in early 2009, and the majority of the mechanical system was completed in October 2012. On December 2, 2013, the Tianma 65 telescope passed its acceptance evaluation. By design, the Tianma telescope with a diameter of 65 meters, one of the largest steerable radio telescopes in the world, is a multifunction facility, conducting astrophysics, geodesy, and astrometry, as well as space science. By the end of 2016, Tianma 65 was equipped with seven cryogenic receiver systems (L, C, S/X, Ku, X/Ka, K, and Q). A CDAS and a DBBC2 were installed at the Tianma 65-m telescope for VLBI data acquisition. SESHAN25 and TIANMA65 take part in international VLBI experiments for astrometry, geodesy, and astrophysics research. Apart from its international VLBI activities, the telescope spent a large amount of time on China's Lunar Exploration Project and single dish observations for pulsar and spectral line research.

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2 Component Description

In 2015, the SESHAN25 telescope participated in 28 IVS sessions (including ten INT3 Intensive sessions). And TIANMA65 participated in five IVS sessions. In 2016, the SESHAN25 telescope participated in 36 IVS sessions (including ten INT3 Intensive sessions). And TIANMA65 participated in four IVS sessions.

Table 1 Statistics of experiments observed.

Session Name	2015 (SH)	2016 (SH)	2015 (T6)	2016 (T6)
AOV	2	3	1	1
APSG	1	2	0	0
AUS-AST	0	1	0	1
IVS-R1	10	15	0	0
IVS-T2	1	2	0	0
IVS-R&D	4	3	2	2
IVS-CRF	0	0	2	0
IVS-INT3	10	10	0	0

3 Current Status and Activities

3.1 Antenna Maintenance with SESHAN25

From November 26, 2015 to February 13, 2016, the rail and the gear box were replaced. We also did some maintenance work with antenna winding and others. From November to December 2016, we did some maintenance work with antenna structure reinforcement and spray paint, etc.

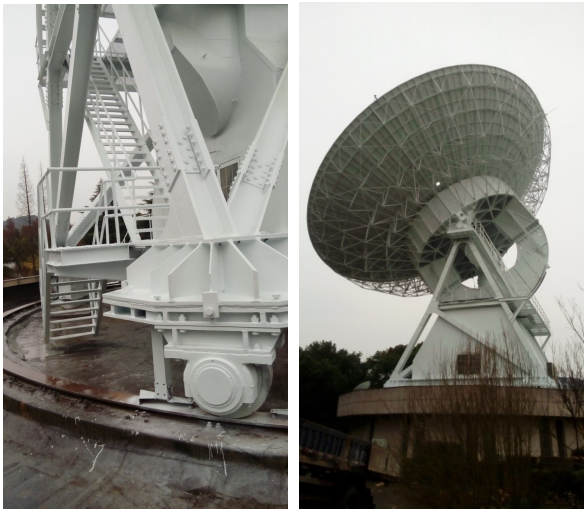

Fig. 1 Antenna maintenance of the SHESHAN 25-m telescope.

3.2 Antenna Maintenance with TIANMA65

From March 19 to April 26, 2015, the elevation drive structure installation and commissioning was done. From April 28 to May 23, 2016, we also did some antenna maintenance such as painting at a rusted place, replacing a nylon wheel guide rail coat, screwing in primary panel bolts, replacing winding at a central pivot, maintaining and testing azimuth and elevation code, and replacing actuators of the active surface. The accuracy of the primary reflector surface reached 0.3 mm after the primary panel bolts were screwed in. The elevation speed motor was replaced during June 2016.

3.3 Other Upgrades

We installed a new DBBC2 at SESHAN25 in December 2015 and began to use it in March 2016. For the DBBC2 at Tianma65, strong RFI was found in the bandpass when using V105-E mode, so we plan to have it repaired.

3.4 Seshan VGOS Station Construction

The Sheshan VGOS station is located at the yard of the Tianma radio telescope. Now the foundation's underground part is being built, the receiver with a frequency range from 2.7 GHz to 18 GHz is being manufactured, the data acquisition equipment CDAS-2A is ready with the capability of 8 x 512 Gbps/s, the antenna is ready to be installed, and two Mark 6 recorders have also been purchased. The hydrogen clock and the meteorological system will be shared with TIANMA65. The station integration is scheduled for this August. The station is expected to do test observations at the end of this year.

4 The Staff of the Shanghai VLBI Station

Table 2 lists the group members at the Shanghai VLBI Station. The staff is involved in the VLBI program at the station with various responsibilities.

5 Future Plans

In 2017, SESHAN25 will take part in 30 IVS sessions and 13 INT3 sessions. Meanwhile, TIANMA65 will take part in five IVS sessions. The telescopes are also scheduled to track China's lunar probe in the Chang'e-5 sample return mission.

Fig. 2 Antenna maintenance of the Tianma 65-m telescope.

Table 2 The staff at the Shanghai VLBI station.

Name	Background	Position and Duty	Contact
Xiaoyu Hong	Astrophysics	Director, Astrophysics	xhong@shao.ac.cn
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