

# Sheshan VLBI Station Report for 2003

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## Abstract

The Sheshan 25-meter radio telescope is an alt-az antenna run by Shanghai Astronomical Observatory (SHAO), Chinese Academy of Sciences (CAS). It is one of the five main astronomical facilities of Chinese National Astronomical Observatories. The VLBI station is a member of the EVN, IVS, and APT. Sheshan station also participated in a large mount VSOP survey observation in the period from 1997 to 2003. We give a short report the current status and future plans of Sheshan VLBI station of Shanghai Astronomical Observatory as an IVS Network Station.

## 1. Introduction

The telescope is located about 30 km west of Shanghai. Station is located at longitude:  $121^{\circ} 11' 59''$  E, latitude:  $31^{\circ} 05' 57''$  N, and height 5 meters above the sea level (ground).

The radio telescope started its operation in 1987. It is one of the five main astronomical facilities of Chinese National Astronomical Observatories. The VLBI station is a member of the EVN, APT and IVS. There is a two-station Mark IV data processor and an analysis center of IERS of various space geodetic observations in Shanghai Astronomical Observatory.

Sheshan station participates into the EVN session for astrophysics, IVS session for the geodetic purpose, and VSOP survey program.

## 2. Facilities

### 2.1. Antenna

Diameter : 25 meters

Antenna type: Kashegelun beam wave-guide

Seat-rack type: Azimuth-pitching ring

Main surface precision: 0.65 mm (rms)

Point precision:  $20''$  (rms)

Rolling range: Azimuth :  $-86^{\circ} - 425^{\circ}$ ; Elevation:  $5^{\circ} - 88^{\circ}$

Maximum rolling speed: Azimuth :  $0.55^{\circ}/\text{sec}$ ; Elevation:  $0.28^{\circ}/\text{sec}$

The quick frequency changing system has been built. Since the L band feed is located at main focus while the other feeds are located in second focus, the switch frequency system does not include L band. We can change the observed frequency among 3.6/13 cm, 6 cm and 1.3 cm in 5 minutes. We still need 30 minutes from L band to the others.

The antenna surface adjustment has been done before September of 2003. The efficiencies at short wavelengths have been improved.

The efficiency at 22 GHz has not been measured carefully yet. We do not have the parameters at this moment.

## 2.2. Receiver

Five bands for VLBI observations are available at Sheshan VLBI station: L band (18 cm), C band (6 cm), K band (1.3 cm), and S/X band (13/3.6 cm). The parameters of the receivers are listed in Table 1. Column 1 gives the observation band. The frequency range is listed in column 2, followed by the efficiency of each band in column 3. The receiver type, system temperature, and polarization model are listed in columns 4, 5 and 6, respectively.

The L, C, and K bands are used for astrophysics and S/X double frequencies are used for geodesy. X band is also used for astrophysical observations sometimes.

A new C-band receiver with double polarization will be available in the second half of 2004.

Table 1. VLBI Receivers of Sheshan Satation

| <b>Band</b><br>(cm)<br>(1) | <b>Bandwidth</b><br>(MHz)<br>(2) | <b>Efficiency</b><br>(%)<br>(3) | <b>Type</b><br>(4) | $T_{system}$<br>(K)<br>(5) | Polarization<br>(6) |
|----------------------------|----------------------------------|---------------------------------|--------------------|----------------------------|---------------------|
| 18                         | 1620-1680                        | 40                              | Room Temperature   | $\sim 100$                 | LCP & RCP           |
| 13                         | 2150-2350                        | 45                              | Room Temperature   | $\sim 100$                 | RCP                 |
| 6                          | 4700-5100                        | 58                              | Cryogenic          | 45-50                      | LCP                 |
| 3.6                        | 8200-9000                        | 50                              | Cryogenic          | $\sim 50$                  | RCP                 |
| 1.3                        | 22100-22600                      | $\sim 20$                       | Cryogenic          | $\sim 110$                 | RCP & LCP           |

## 2.3. Recording System

VLBA, Mark IV and S2 recording systems are available now at Sheshan VLBI station. Mark IV upgrade of Sheshan station has completed in 2000. Two head stacks recording system has been tested successfully and good fringes have been found to Sheshan station, both head-stacks successfully. The performance of the observing system of Shanghai station has been more advanced over the last few years.

The Field System has been upgraded to 9.5.17 version and it works well for Sheshan station in the second half of 2002. The Mark IV recording system works well for EVN and IVS observations, and S2 recording system work well for VSOP observation. Two head stacks recording system has been tested successfully and good fringes have been found to Sheshan station.

We are purchasing a Mark 5A system for Sheshan station. It will be delivered to Shanghai at the beginning of 2004.

## 3. Personnel

There are some changes of the staff at Sheshan station. The main staff members at Sheshan VLBI Station are listed in following Table 2.

Prof. Liang Shiguang retired in the Nov. 2003. He is still employed to work for our station after he retired.

Table 2 - The main staff in Sheshan VLBI Station

| <b>Name</b>     | <b>Position</b>    | <b>Working area</b> | <b>email address</b> |
|-----------------|--------------------|---------------------|----------------------|
| Xiaoyu Hong     | Professor          | Head of station     | xhong@shao.ac.cn     |
| Wenren Wei      | Professor          | Chief Engineer      | wwr@shao.ac.cn       |
| Shi-guang Liang | Professor          | Microware           | sgliang@shao.ac.cn   |
| Xinyong Huang   | Senior Engineer    | VLBI friend         | xhuang@shao.ac.cn    |
| Zhuhe Xue       | Senior Engineer    | Terminal software   | zhxue@shao.ac.cn     |
| Qing-yuan Fan   | Senior Engineer    | Antenna control     | qyfan@shao.ac.cn     |
| Song-lin Chen   | Engineer           | Microware           | slchen@shao.ac.cn    |
| Bin Li          | Engineer           | Microware           | bing@shao.ac.cn      |
| Jinqing Wang    | Engineer           | Observation et al   | jqwang@shao.ac.cn    |
| Huihua Li       | Engineer           | Observation et al   | hhlee@shao.ac.cn     |
| Lingling Wang   | Engineer           | Observation et al   | llwang@shao.ac.cn    |
| Ruiming Tu      | Engineer           | Observation et al   | trmshao@shao.ac.cn   |
| Ming Zhang      | Associate Research | Astrophysics        | zhangm@shao.ac.cn    |
| Weihua Wang     | Associate Research | Astrophysics        | whwang@shao.ac.cn    |

#### 4. Current Status & Activities and Future Plans

A new Hydrogen Maser Clock has been ordered from Datum for Sheshan VLBI station. The export license has been approved by USA. We expect to have it in 2004.

Since the antenna control system is not quite stable now, we plan to upgrade it in 2004.