

OAN - Yebes station report

Ventspils TOG meeting 23 May 2017

VLBI Equipment

Currently Ys is equipped with 2 **Mark5B+** and 2 **DBBC2** units with 4 IFs, 4 ADB2 and 4 CORE2s each. Both DBBCs are equipped with an internal Fila10G unit. We also have 2 Flexbuf units with 36 disks; one units with a total of 144 TB (4 TB disks) each and one unit with 216 TB (6 TB disks). A third unit (144 TB) was sent to JIVE correlator in 2016.

The two Mark5B+ are not used since June 2016. The 144 TB Flexbuff is used for non-EVN VLBI observations (IVS, Radioastron, GMVA and third party ones). The 216 TB unit is only for the EVN. Experiments are etransferred from the Flexbuff to Bonn, Washington and JIVE correlators using m5copy. Flexbuffs are running Debian Jessie and jive5ab 2.7.1 version. We wrote a report about our experience (<http://www1.oan.es/informes/archivos/ITCDT-2016-12.pdf>). Some experiments to Bonn correlator are recorded in the Flexbuffs and later transferred locally to a disk pack using jive5ab, m5copy and one of the Mark5B+ units.

One of our DBBC2 has a broken IF input connector that failed due to too many cable connections and disconnections. This has invalidated one of our Ifs.

The old Harrobox running Debian Jessie (8.2) is used as a proxy between the FS and the DBBC allowing the JIVE correlator to control the flow of data from the Fila10G when doing eVLBI. This host is in the public LAN but allows connections from the private LAN.

There are two Mark6s installed in Yebes of which only one is being used. The Mark6 runs dplane 1.21 and is regularly been used for VGOS test observations at the 13.2m antenna. 12 packs 32 TB each are available, mostly for geodetic observations.

Four RDBEG units are used for VGOS observations. Each can handle 2 bands 512 MHz wide using PFB. The RDBEGs have provided stability as compared to the DBBC2s. The RDBEGs provide several features which would be very welcome in the DBBC2: multicast, internal counters for comparison with the station PPS and the GPS PPS, real time phase cal detection (amplitude and phase of several tones simultaneously) and continuum cal noise diode detection. Our experience is summarized in report: <http://www1.oan.es/informes/archivos/IT-CDT-2016-21.pdf>

Field System

We are running three FS computers:

- The 40m one uses Field System version 9.11.19 on Debian Wheezy.
- The 13.2m one uses Field System version 9.12.11 on Debian Jessie.
- A test computer which can be connected to any of the non-used backends. Debian Jessie and FS 9.11.19

The connection method between the FS and the control computer of both the 40 m and the 13.2 m radiotelescopes is done via sockets and has been designed to allow the control of a twin telescope from a single Field System computer. The system works reliably since almost

2 years ago. We have also modified our station code to be able to run a time counter for the cable measurement using an Ethernet to GPIB converter.

We have developed a script for plotting the autocorrelation spectra that uses DifX and runs in the FS computer. The procedure downloads the data from the Flexbuff and copies it to the FS hard disk where it is shown continuously.

VLBI EVN observations

We regularly run several VLBI programs at Yebes: EVN, IVS (geodetic observations), GMVA (Global millimeter VLBI) and Radioastron observations. Since June 2011 the telescope is managed by operators during 80% of the time. The rest of the time operations are done in an unattended and automatic way.

EVN sessions 2016-3 and 2017-1: ~50 EVN observations in C, X, K and Q band. Continuous calibration mode (80 Hz applied to a noise diode) works in C, X and K bands.

Out of session: Taken part in OoS observations

Fringe tests: 6 tests (4 Gb/s and 43 GHz), Ghana, eVLBI @ 4 Gb/s

Radioastron: 159 observations

eVLBI: 8 observations

GMVA: 12 observations

Continuous calibration

Fran Beltran maintains a Python script to generate antabf files from the log files. The script supports single shot diode calibration, continuous calibration, hot load (chopper wheel method), DDC and PFB mode and multi-frequency experiments.

Disk purchases

No purchases since last report in 2016.

Spares

The VLBA terminal was dismantled by the end of 2014. We sent the old VSI formatter to Haystack. 14 BBCs are available. 3 of them are faulty. We also have some IO Mark5B+ boards and some main boards for the Mark5B+.

We have lent temporarily one Fila10G unit to Toruń.

Gigabit connection

Yebes is connected to RedIris, the Spanish NREN using a 10 Gb/s dark fiber since May 2012.

40m radiotelescope

Last April the 22 GHz and 45 GHz receivers have been overhauled again. The IF output for both of them is 2.5 GHz and 9.5 GHz respectively. None of the receivers has been tested in

a VLBI observation. The best T_{sys} achieved at 45 GHz is ~ 85 K. Both receivers can observe simultaneously.

The air conditioning system at the backends room keeps the room at 21 C plus minus 0.2 C leading to an improvement of the stability of the signal phase (specially relevant in geodetic observations) and to a safe temperature for the Flexbuff disks.

13.2 m radiotelescope

The 13.2m radiotelescope has been taking part in VGOS test observations since April 2016. Current observations with 4 RDBEGs + 1 Mark6 are 24 hour long and are performed every 2 weeks.

Pablo de Vicente