Hartebeesthoek (Hh) Station Report - TOG Meeting - October 2014

26-m telescope (Hh):

The 26-m telescope remains fully operational and is now equipped with a K-band cryogenic receiver, though we have yet to use this for EVN operations.

Although the encoder on the subreflector tilt mechanism has been installed, the upgrade of the motor controller to make use of this higher precision readout is still in progress. This upgrade is aimed at developing a better pointing model and improving pointing performance, a necessity for proper K-band operation.

15-m telescope (Ht):

The 15-m antenna has a cryogenic S/X receiver and is mainly used operationally to support routine geodetic VLBI using its own independent DBBC and Mark5B+ recorder. It is available for EVN use on an ad-hoc basis.

Session I - Feb/Mar 2014:

The first session of the year was quite busy with 16 experiments scheduled, of which 10 were user experiments, comprising some 83% of the 81 hours (35 hours L-band, 35 hours C-band and 11 hours K-band) of recording time and some 91% of the 26.30 Tbytes of recorded data. The average filling factor of the disk-packs was only around 81% due to the large sizes of the 2 packs involved. We shipped 0.79 Tbytes (ie. 3%) of the user data (from one experiment) electronically to the Bonn correlator.

Some 120 minutes of data (ie. $\sim 2.5\%$) was lost, due to a secondary reflector positioning problem and operator error. There was the usual significant RFI at L-band during the session.

Session II - May/Jun 2014:

This session was relatively quiet with only 10 experiments scheduled, of which 6 were user experiments, comprising some 88% of the 64 hours (42 hours L-band and 22 hours C-band) of recording time and some 92% of the 16.91 Tbytes of recorded data. The average filling factor of the disk-packs used was around 94%.

Only 15 minutes of data (ie. ~ 0.4 %) from one experiment was lost, due to operator error. There was the usual significant RFI at L-band during the session.

e-VLBI / Connectivity:

Over the period February to September 2014 Hartebeesthoek participated in a total of only 3 e-VLBI sessions, 2 at C-band and 1 at L-band, comprising some 31 hours of user data. The dedicated layer-2 2 Gbps 'light-path' connection to JIVE behaved reasonably well with only about 45 minutes lost due to a route instability during one session.

Out of Session experiments:

Additionally Hartebeesthoek supported 5 out-of-session RadioAstron imaging observations, 2 under the auspices of the LBA and 3 as part of the EVN (plus roughly 130 ~1 hour RadioAstron survey observations). In addition the 15-m continues to be used extensively for scintillation experiments using the VEX and MEX spacecraft downlinks. All of these activities were conducted using electronic shipment of the recorded data. (Only the JIVE and Socorro (VLBA) correlators continue to require physical shipment of media.)

Mark5(B/B+/C) Recorders:

Our one Mark5B and two Mark5B+ recorders enable us to record all three VLBI backends (two on the 26-m and one on the 15-m) simultaneously. In addition we have a Mark5C recorder (on loan from the University of Tasmania in support of collaboration with the AuScope array) to assist with off-line electronic shipment of data. We also have the parts necessary to upgrade one Mark5B+ into a Mark5C in future if so required.

A "Harrobox" on loan from JIVE is currently also installed on site.

Disks:

No new disk-packs were acquired for the EVN pool over this period.

Mark5 Terminal:

The Mark5 rack has now been officially retired (apart from the 5 MHz distributor and VLBI delay calibrator ground unit modules) but still continues to function reasonably well, apart from one video converter which appears to have a problem with its communications board.

DBBC Terminals:

The two DBBC units (HB1 and HB2) continue to be used in DDC mode as the primary VLBI terminals on the 15-m and 26-m antenna respectively, with full Field System support. The FILA10G boards installed in both have not yet been properly commissioned due in part to synchronisation issues on pass through of the associated DBBC VSI-H outputs.

Frequency Standards:

HartRAO continued to operate on our T4Science iMaser-3000 (iMaser-72) during both sessions. Our EFOS-C (EFOS-28) maser is also fully operational and is used as the frequency standard for the 15-m VLBI terminal to allow us to offset the two antennas in frequency if required. Our original EFOS-A maser (EFOS-6) is also operational and we also have a Vremya VCH-314 two-channel precision frequency comparator to allow intercomparison of the three masers.

Receivers:

The original ambient K-band test receiver was replaced with a fully functional (except for phase-cal injection) cryogenic dual polarisation receiver in May 2014.

Software:

Field System: FS 9.11.6 running on FS Linux 8 (Debian "lenny") kernel 2.6.262
DBBC versions: DDC v104_2 / PFB v14 running on Windows XP
Mark5B version: jive5ab 2.5.1-beta running on Debian "etch" kernel 2.6.18-6
Mark5C version: jive5ab 2.5.1-beTa running on Debian "lenny" kernel 2.6.26-2

Spares:

Currently available VLBI-related spare parts at HartRAO are:

o A spare 2 m VSI-H interface cable.

o A Conduant 10GigE mezzanine board suitable for upgrading a Mark5B+ to a Mark5C.

Other used parts from recent upgrades or obtained from obsolete equipment at Haystack are:

- o A Mark5A I/O board with its related external interface assembly.
- o Various boards from a Mark4 formatter (from conversion to a VSI4 sampler unit).
- o A Mark4 IF Distributor unit master control board and IF component assembly
 (with faults).
- o Several Mark4 'MAT" ASCII transceiver boards (some faulty).
- o Assorted Mark4 Video Converter unit sub-modules (some faulty).

J.F.H. Quick 17 September 2014