

## Hartebeesthoek (Hh) Station Report - TOG Meeting - June 2012

The Hartbeesthoek 26m telescope continues to perform well after it's repair, though an updated pointing model adequate for higher frequencies is pending on an upgrade of the secondary reflector positioning system.

A cooled dual polarisation S/X prime-focus receiver is now installed on the 15m antenna (primarily) for geodetic VLBI operation.

### Session III - Oct/Nov 2011:

This session was reasonably quiet with 13 experiment scheduled, of which 9 were user experiments, comprising some 86% of the 88.5 hours (11.5 hours C-band, 35 hours L-band, 27 hours X-band and 15 hours K-band) of recording time and some 86% of the 17054.0 Gbytes of recorded data. The average filling factor of the disk-packs was over 76%. Some 2476.2 Gbytes (ie. 17%) of the user data (from one experiment) was electronically shipped to the Bonn correlator.

Only 8 minutes of data (ie. <0.1%) was lost due to the FS not been rebooted recently enough causing a time step during an experiment. We continued to experience significant L-band RFI during the session.

### Session I - Feb/Mar 2012:

This session was very busy with 21 experiments scheduled, of which 13 were user experiments, comprising some 80% of the 112.5 hours (14 hours X-band, 12 hours K-band, 27.5 hours L-band and 59 hours C-band) of recording time and some 91% of the 35037.0 Gbytes of recorded data. The average filling factor of the disk-packs was over 97%. We shipped 2476.2 Gbytes (ie. 8%) of the user data (from one experiment) electronically to the Bonn correlator and a further 877.4 Gbytes (ie. 3%) from two RadioAstron user experiments to the ASC correlator in Moscow (also via Bonn).

A further 1148 Gbytes of data was copied to JIVE for testing of the new DBBC digital backends.

Some 74 minutes of data (ie. ~1%) was lost, mainly due to late starts caused by operator error, and otherwise by an encoder jump, a disconnected cable and various software glitches. There was still significant RFI at L-band during the session.

### Session II - May/Jun 2012:

This session was reasonably quiet with 9 (+3 e-EVN) experiments scheduled, of which 5 (+3) were user experiments, comprising some 90% of the 123 hours (75 hours S/X-band, 7 hours C-band, 14 hours K-band and 39 hours L-band) of recording time and some 80% of the 11616.6 Gbytes of recorded data. A further ~9500 Gbytes was scheduled to be streamed to JIVE in e-VLBI mode. The average filling factor of shipped disk-packs was over 94%, and some 5950.8 Gbytes (ie. 64%) of the user data (from two experiments) was electronically shipped to Bonn.

A further 3451 Gbytes of data was copied to JIVE for further testing of the new DBBC digital backends.

A total of 61 minutes of data (ie. <1.0%) was lost, mainly due to the failure of our EFOS28 maser in mid-experiment and otherwise due to various software

glitches in our control system and jive5ab. Significant RFI at L-band continued.

#### e-VLBI / Connectivity

Over the period August 2011 to June 2012 Hartebeesthoek participated in a total of 9 e-VLBI sessions (+2 during the May/Jun EVN disk session), 2 (+2) at L-band and 7 at C-band comprising about 79 (+18) hours of user data. In April 2012 a dedicated layer-2 2Gbps 'light-path' connection direct to JIVE was commissioned. One session was run with an ambient receiver, one was limited to 512Mbps by an undersea fibre cable fault and an hour of another was lost due to failure of the light-path during the experiment.

#### Mark5(B/B+) Recorders:

In February 2012, we took delivery of an additional Mark5B+ recorder together with a spare motherboard, power supply and VSI-H cable. Thus we now have three interchangeable VSI-H compatible recorders on site, enabling us to record all three VLBI backends in parallel. We also have the parts necessary to upgrade two of the recorders to Mark5C as and when required.

#### Mark "5" Terminal:

The Mark5 rack continues to perform reasonably well, though an intermittent fault in our IF distributor module remains elusive. We are still operating with out a working spare video converter, the unit we have lacks a functional synthesizer/divider module. However faults in the ascii transceiver of one video converter and the TPI circuitry of another have been repaired in the interim. Additionally, Haystack Observatory has supplied us with a 10kHz generator designed for comparison with phase-calibration tones.

#### DBBC Terminals:

Two DBBC units from HAT-Lab s.r.i. (HB1 and HB2) were received in January 2012 and have been under test for the last two sessions. One unit has a minor fault in a input conditioning module, but otherwise they appear to be functioning normally and both have successfully produced fringes.

#### Frequency Standards:

HartRAO was forced to switch to a new freshly delivered T4Science iMaser-3000 (iMaser-72) during the May/Jun session due to the unexpected failure of our trusty EFOS-C (EFOS-28) maser which had otherwised performed flawlessly since its installation over six years ago. This failure has subsequently been traced to a bad joint in the Datum OXCO unit which has now been repaired and EFOS-28 is again operational and being re-commissioned. Additionally our original EFOS-A maser (EFOS-6) is now functional again, following the replacement of both the internal and external vacion pumps, with the re-filling of the hydrogen supply bottle scheduled to occur shortly. Additionally we expect to take delivery of a Vremya VCH-314 precision frequency comparator in June/July to assist with the re-qualification of both EFOS-6 and EFOS-28.

#### 26m Telescope Surface:

There has been no further progress on this issue since the last TOG meeting. At this stage further work is needed on the pointing model, together with development of a cryogenic K-band receiver, before we can declare this capability available for general use, though experiments on strong maser targets are definitely feasible.

#### Receivers:

There have been no changes to our receiver complement since the last TOG meeting apart from the S/X receiver on the new 15m antenna.

#### Other Hardware/Software:

Field System: FS9.10.4 running on FS Linux 8 (Debian "lenny") kernel 2.6.26-2  
Mark5B version: 2007y222d04h running on Debian "etch" kernel 2.6.18-6  
Mark5B+ version: 2007y222d04h running on Debian "etch" kernel 2.6.18-6

Computer (and hence FS) control of the secondary reflector position to enable fast switching between all the available receivers is fully operational, but the proposed upgrade to a shaft encoder on the tilt mechanism is still pending; the current actuator readouts do not allow pointing accuracy sufficient for operation at K-band and above.

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