

# TOG report

## TOG meeting Onsala July 1, 2005

The last TOG meeting was held at [Onsala Space Observatory](#), Sweden on July 1, 2005. Of highest importance were all aspects of reliability and performance, Mark 5, and amplitude calibration. The minutes can be found under [http://www.mpifr-bonn.mpg.de/div/vlbicor/tog\\_chair/togreps05/togminutes.txt](http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togreps05/togminutes.txt).

The next TOG meeting will be hosted by ASTRON at Dwingeloo on March 24, 2006. A mini workshop focused on Mark 5B and amplitude calibration might be held on the day before. The agenda has not yet been finalized.

*Near Real-time fringe checks* are very successful now. They are possible now also for 1 Gbit/s observations. There are problems still with automatic transfer from Seshan and Urumqi. Checking should be ramped up from the present once-per-frequency and -session to one-per-experiment starting with session 1/2006.

*Patching of Mark IV terminals:* Very few stations have to re-patch for 1 Gbit/s dual-polarization. Single polarization observations with more than 128 MHz are a problem. Other: geodetic patching may fail (Jodrell Bank).

*Mk2/Lovell phase referencing* is not yet available for users, but the technique seems to work.

*RFI:* Stations have been urged to monitor RFI (e.g. with CHCHK program) and report significant RFI for inclusion in the EVN status table.

*Phase-cal monitoring:* The phase-cal can be monitored now with the Mark IV decoder. The stations were urged to inspect the phase-cal during the observations to check for instance for unlocked BBCs.

*Measures to improve amplitude calibration:*

- RFI monitoring
- Wx and comments in logs/feedback for Cormac
- stations check amplitude corrections generated by pipeline
- monitor PCAL through session and use FS
- improve continuous cal with optimum tpidiff interval

*FS:* To improve the reliability and help debugging the Field system, stations were urged to send FS error logs and relevant info to Himwich. A new graphical monitoring tool developed by Graham will be implemented in the FS. (for a detailed report on the FS see below)

*22 GHz:* Phase-referencing has been shown to work. Whether the unknown zenith delays are the limiting factor has to be investigated. Amplitude calibration is still bad and Krichbaum should be contacted for advice on calibration at high frequencies.

*Polarization:* Westerbork local interferometer data should be used to calibrate the position angle. The procedure should be described in the EVN users guide.

Medicina has a high polarization leakage at 22 GHz. Urumqi's high leakage at L-band has probably been fixed (awaiting tests).

*Schedule checking and distribution* works well now in general, although 1 observation in the last session was observed with 2 different versions of the schedule. This was due to the schedule being very late and a few more unfortunate coincidences. Another schedule with a single long scan caused problems at stations, however the observation was largely successful.

*Sessions:* The feasibility of more frequent EVN sessions and the preparation time needed for ToO projects was discussed.

1. 1 fixed day per month reserved for VLBI. The stations would be informed a few weeks in advance whether this day is needed or not. This would allow the EVN to support monitoring

project which require more frequent observations.

*Summary of the discussion:* This is like the monthly e-VLBI tests and would be possible at most stations, though it increases the strain on resources. This day should be a weekday which might cause problems for instance at Effelsberg.

2. *Target of opportunity observations:*

*Summary of the discussion:* Most stations would need at least a week to get ready for a ToO observation. Other constraints like for instance mm-observing in winter at Onsala, or geodetic observing exist.

**Reliability and Performance (see Zsolt Paragi's report):**

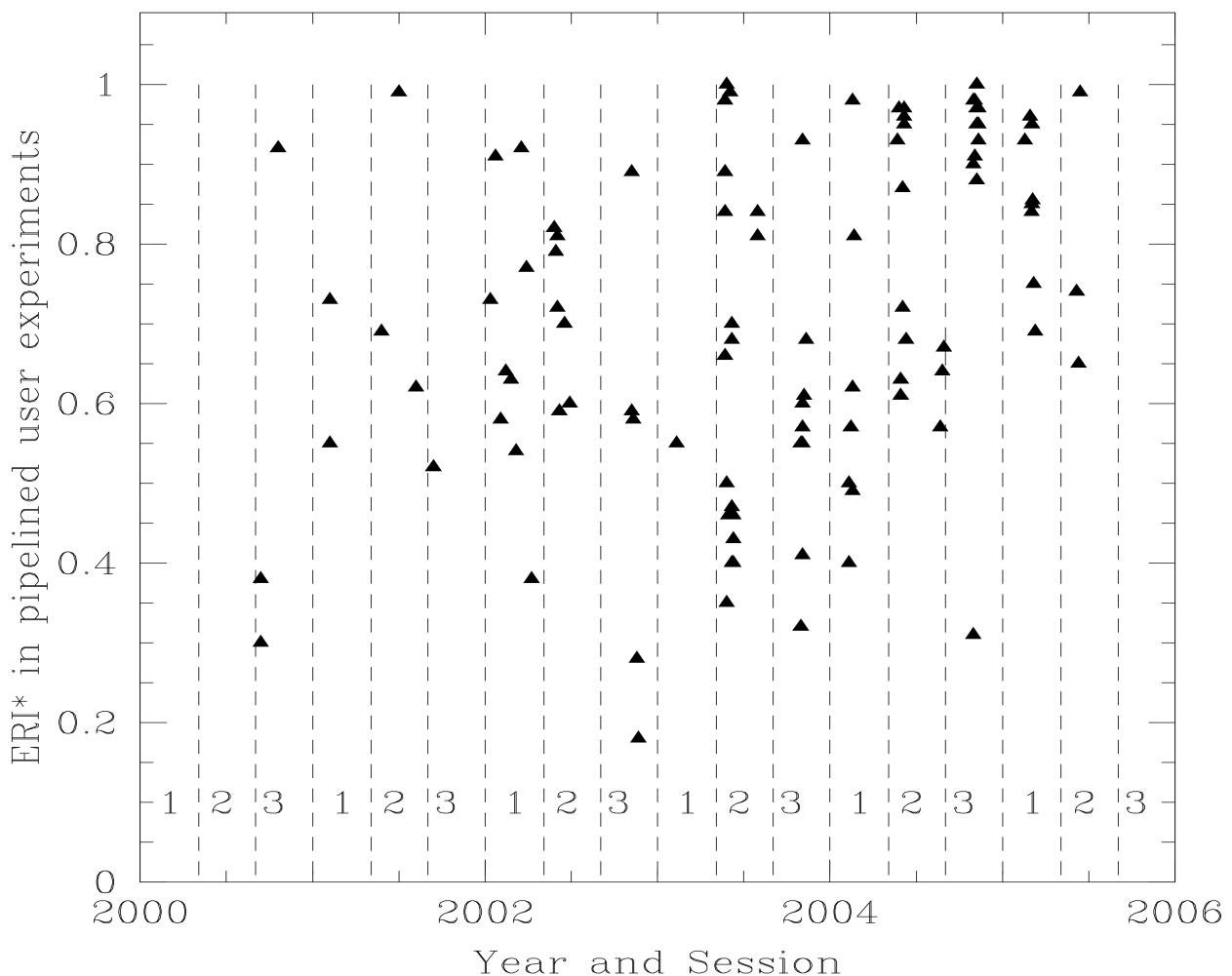
*Session 2/2005*

The session as a whole had more failures than session 1/2005. Noto was lost early in the session because the azimuth drive broke. Torun used a Rubidium frequency standard, not stable enough for phase-referencing observations. Mark 5 to FS communication problems occurred a number of times at various stations and caused losses on the order of 1/2 to 1 hour of data. At Urumqi the wrong block schedule was used so that one observation was missed.

*Session 3/2005:*

Session 3 went well in general. Noto was still broken. Torun was lost in 3 observations due to a disk failure and shortage of disks. Cambridge lost nearly all observations for which it was scheduled due to a PSU failure in the VLBA rack. The wrong version of EP053 was observed at Wb, Sh due to a combination of various failures. Robledo had first fringes at 1 Gbits/s

The EVN Reliability Indicator (ERI, see plot below from Paragi; please print for proper display)



### **Amplitude calibration (session 1&2/2005; see Cormac Reynold's report):**

No significant improvement can be reported for the quality of amplitude calibration from sessions in 2005. Even if we accept a factor of 2 worse calibration than that of VLBA antennas, only a few EVN stations can meet this limit and deliver acceptable calibration. Problematic are in particular K-band and RFI at L-band. The calibration of Torun at C-band has been significantly enhanced.

### **Automatic flagging (see Cormac Reynold's report):**

Westerbork is implementing a scheme for automatic flagging. All other stations work well.

### **Mark5 (EVN status):**

- All EVN stations including Robledo have a Mark 5 recorder and have successfully recorded data with it up to 1 Gbits/s (there might still be a problem at Robledo)
- All sessions in 2005 have been disk-only (except for observations for the VLBA correlator). Some EVN stations recorded projects to be correlated at Socorro on disks in session 3/2005. All VLBA antennas recorded on disks for projects to be correlated at JIVE; disks were provided by the EVN.
- Since the May/June session “disk schedules” have been introduced. This causes problems for globals with tapes to be correlated in Socorro: The Pis have to use different station files for SCHED.
- The Field System can handle “disk schedules”. All EVN stations use the latest version. Robledo will try to upgrade to the latest version for EVN projects.
- NRAO's track program now fully supports Mark5 disks. The entries are still partly wrong or incomplete. (has to be fixed at the correlators)
- The aim to switch to 1 Gbit default for continuum VLBI in session 3/2005 was not attainable as disks had to be provided for the VLBA for global observations to be correlated at JIVE
- New problems with the Mark 5 to field system communication were reported to Haystack.
- Several disks (mostly from NRAO) had the write pointer set to 0 which inhibits playback. The data can in general be recovered with the latest version of the Mark 5 software.

### ***Serial ATA disks (see report by Shep Doeleman)***

### ***Mark 5B (see report by Shep Doeleman)***

### **1 Gbps as default:**

The scheduler has assembled detailed statistics about the amount of disk space used for past sessions. His extrapolation yields that about 450 TB per session would have been needed if all short-wavelength continuum observations had been recorded at 1 Gbit/s. The amount of disk space scheduled per session has risen continuously to 200 TB in June and 270 TB in October 2005. JIVE can sustain a 2-session disk turnaround and is attempting to increase the throughput even further. The amount of observing scheduled in February will be relatively small, so that it could be attempted to switch the February 2006 session to 1 Gbit/s default recording bitrate for continuum observations.

*The TOG recommends to the directors to change the correlation priorities at JIVE so that 1 Gbits/s observations can be correlated with higher priority to free more disks more quickly.*

The disk inventory as of November 18 can be found in the table 1 below. Noto, Westerbork, and Jodrell did not provide updated info for this report. Arecibo confirmed their entry before the report was submitted.

It should not be forgotten that a disk buffer is needed for VLBA disks “languishing” at JIVE. For session 3/2005 16 8-packs were supplied to NRAO.

Station	Total	1 TB	1.3 TB	1.4 TB	1.6 TB	2 TB	2.4 TB	3.2 TB
Effelsberg	197	37	0	26	10	12	0	26
Westerbork	58	0	0	20	0	14	0	0
Onsala	85	5	39	0	0	15	0	0
JIVE	52	0	0	0	0	26	0	0
Medicina	89	4	0	0	0	22	0	13
Jodrell	69	0	0	2	5	24	0	3
Urumqi	47	0	0	2	0	22	0	0
Harrao	26	0	20	0	0	0	0	0
Arecibo	20	0	0	0	0	10	0	0
Metsähovi	15	1	0	0	0	2	3	1
Yebes	11	0	0	0	3	3	0	0
Seshan	28	0	2	0	2	11	0	0
Torun	13	0	0	0	2	5	0	0
Noto	59	12	0	0	0	14	0	6
Wettzell	0							

SUM 768 "=up to date"

Table 1: Disk inventory as communicated by EVN stations. "Green" stations replied to latest query.

1	AP	0
2	AR	1
3	BONN	92
4	EB	7
5	FT	1
6	GB	2
7	GC	3
8	HAY	13
9	HH	1
10	HN	1
11	JB	7
12	JV	264
13	KK	1
14	MC	12
15	MH	1
16	MK	3
17	MR	1
18	NT	10
19	NY	4
20	ON	5
21	PB	1
22	PV	1
23	RO	1
24	SH	1
25	SOC	15
26	SV	3
27	TC	4
28	TR	1
29	UR	1
30	WASH	6
31	WB	12
32	WF	1 Hh
33	WZ	1 Hh

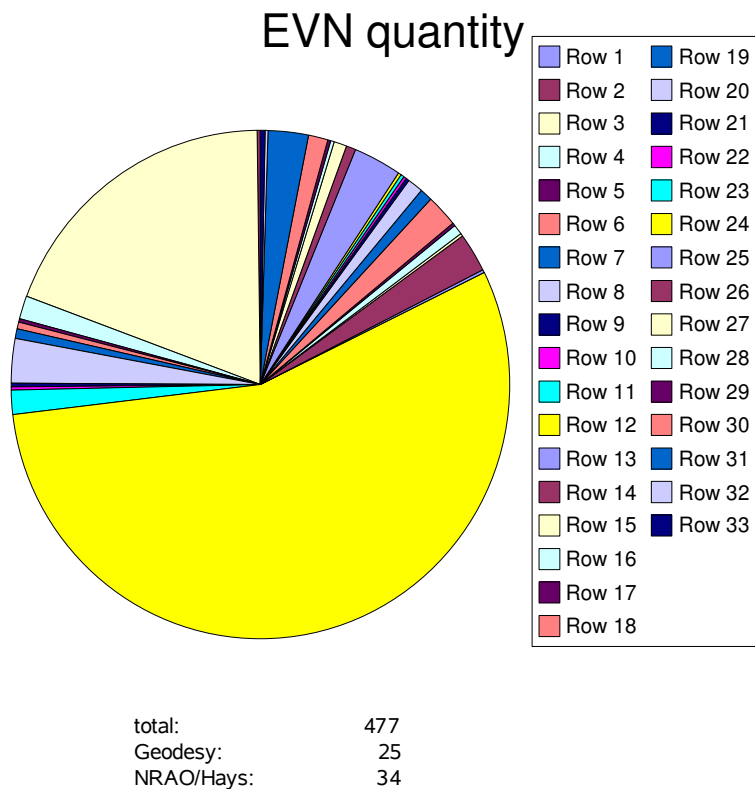


Table 2: 'track' summary of the location of EVN 8-packs. Red are geodetic stations. Blue are NRAO and Haystack.

A first attempt to use **track** to verify losses of EVN disks to the geodetic pool, UVLBI, and NRAO (table 2) showed expected discrepancies in the number of 8-packs and capacities to the inventory in table 1, as not all track entries have already been corrected, nor have all 8-packs been registered in track. An additional problem is that some EVN stations do not carefully distinguish between geodetic and astronomical 8-packs. Nevertheless it can be seen that less than 5% of EVN disk packs have migrated to the geodetic pool; more than 5% of the disk-packs are at NRAO and Haystack..

**Field System:** Since the June session “Disk” schedules are the default now for EVN-only observations. A few small bugs are known in the present release. As presented at the TOG meeting the plans were (see presentation by Ed Himwich :

[http://www.mpifr-bonn.mpg.de/div/vlbicor/tog\\_chair/togreps05/FS\\_Tog\\_July\\_2005.ppt](http://www.mpifr-bonn.mpg.de/div/vlbicor/tog_chair/togreps05/FS_Tog_July_2005.ppt) ):

- enable VLBA correlation of FS recorded Mark5 disks (allowed correlation of EVN disk recordings of session 3/2005 at the VLBA correlator )
- Automated ftp transfer
- Field labels designed for disk packs
- Phase-cal extraction support for Mark IV decoders
- CHEKR monitoring of Mark5
- Update Mark 5 “Remaining Capacity” display while recording
- Upgrade of operating system
- automate station check-out
- More diagnostic tests

longer term items are:

- Improved Tsys (most items completed)
- Post processing program to generate AIPS (ANTAB) format TSYs files from C. Reynolds
- Periodic firing of calibration diode with flagging needed
- Band changes
- IF patching automation for Mark IV racks
- Phase-cal control monitoring from VEX schedules
- Mark 5B support expected when device available

**IF switchbox:** The prototype has been in operation at Effelsberg since June 2005. It is driven by an slightly adapted version of the Field system.

**DBBC development (see report by G. Tuccari):** A prototype unit is nearing completion (expected January). It will have 4 IF input channels. Maximum output bitrate will be 2048 Mbits/s. Several configurations for 256 MHz input bands are operational. Testing, development of new configurations, and implementation of the next-generation FPGA chips are planned for 2006.