

## Performance and Reliability of the EVN

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EVN Session 3/2012

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The session consisted of five frequency blocks (18/21cm, 6cm, 3.6cm, 5cm, 1.3cm). It was reported just before the session that Jb1 was replaced by Jb2 due to an azimuth-track wheel casualty and Sv had a central bearing. In each block, ftp-fringe tests and NME experiments were performed before the user experiments. The first experiment N12L3 went successfully at all the participating stations. Jb2 had problems with the formatter in F12C2 and then fixed the problem in the next run N12C3. Badary was out in N12X3 because of bad weather. Fringes to Hart in the production correlation of N12K4 were clearly found while not seen during the ftp fringe test because of the limited sensitivity. There were also test DBBC data sent by Hh, Nt, On. Fringes to these DBBC stations were also clearly found.

### Highlights

- (1) The first fringes to Torun new 22 GHz receiver in N12K4, Nov 6, 2012.
- (2) For the first times, the KVN stations participated in the EVN NME experiment and sent their diskpacks to JIVE.
- (3) As an additional bonus station, Robeldo 70m radio telescope participated in 6 EVN user experiments.
- (4) All the EVN disk-recording experiments were done by JIVE software correlator SFXC since Session 3/2012.
- (5) GM070 was correlated with 23 participating stations -- The biggest VLBI experiment in the JIVE history.

There were 33 user experiments (12 at 18/21cm, 9 at 6cm, 2 at 3.6cm, 6 at 5cm and 4 at 1.3cm) in Session 3/2012. There were one To0 experiment R0004B and two Global experiments RM070 and GK045. There were three experiments (EG067A, EG067B, GK045) correlated at Bonn.

### Station and correlator feedback for individual stations:

Ef - No observations in EG066F because of a failure of the secondary focus receiver cooling just after N12C4. Because of cooling problems, lost the first 23 minutes in EG062A. Started 25 min late in EY015D because MK5 hung up during first scan. The 16MHz subbands for the new DBBC backend cut off ~1.5MHz from the low- and high-side, which caused the central channels had higher (~10%) correlation amplitude on the baselines to Ef because the correlator use the auto-correlation amplitude integrated across the whole subband to normalise the cross-correlation amplitude.

Wb - Missed the first 35 minutes due to backend problems in GM070. In all oct/nov'12 experiments (E0009, EA051) that involved USB or LSB only, the IFs corresponding to the upper-half of the BBCs used did not produce fringes (and also an oddly-shaped autocorrelation).

On - Out in EG066E because of antenna problems (fuse for the declination break failed). No observations in EG062A, parts of GK045A and the last 3.5 hours of EK033A because of strong wind.

Tr - Lost ~2 hours in EP076D due to telescope control problems and Mark5 recording problems.

Nt - No observation for one hour in ES070 because of antenna control unit failure. BBC 6 was dead in EG066B. The formatter was out of data for the whole experiment EG066C. No amplitude for about a half hour in E0009 and for 2.5 hours in EP076C. LCP correlation amplitude was clearly lower (~0.5x) than that of RCP in all the 5cm experiments.

Mc - No data available in all the L-band Gbps observations due to problems with recording. 1-bit sampling was used later to avoid its 1 Gbps recording problem in all the 1Gbps experiments.

Ys - Lost first 4 hours in ET016B due to disk recording failure. There were periods in which the system temperature became huge (best seen in the pipeline results), and this appears to have temporal correlations with when the raw correlator output amplitudes were noticeably reduced (e.g., the amphase-a plot below) in EG062B.

Mh - Participated in all the K-band experiments with its new DBBC backend. The performance was quite good after fixing their receiver problems.

Jb2 - Problems with disk packs and no recording for 40 minutes in GM070. Stopped observations for 4.5 hours in GK045A due to high winds. Because of various instrumental problems, JB2 did not observe RM009A.

Hh - Problems with IF distributor, which had a sticky programmable attenuator causing total power dropouts in RCP channels after Tsys measurements on some scans in EK033A and EP076D.

Ro70 - The 22 GHz experiments R0004B, EE009D, and ET016B were not performed because of problems with subreflector.

Ar - Participated in five EVN user experiments. There were good fringes in EG066B and EG066C. Because there were no log files/VSN available in VLBEER, the diskpacks of ED039, EG066E and EG066F were wrongly labelled in the JIVE database and then erased before correlation.

Ur - Phase-cal was not off in the observing HI absorption line experiment E0009. The disk packs for EY015D and EP076C were lost by shippers. Low correlation amplitude in IF 7-8/RCP in EG062B and EP075E.

Sh - The first half hour of GM070 was out because it suffered an antenna problem. Fringes were quite weak and most likely useless in EA051.

Bd - In E0009, phase-cal was left on rather than off and there were no fringes in RCP channels in the "swapped" patching mode. Also, what appears to be their phase-cal tones shift frequency in both IFs/RCP in the "swapped" patching scans, which could explain why there's no fringes (it's possible that these RCP channels didn't swap their patching, going from the 0.27MHz difference in the fraction-MHz part of the sky frequencies of each IF). There were some clock jumps: about 125ns between 08:57-08:59 in EP076D and about 0.56us between 13:21:19-13:25:49 in EG062B.

Zc - Phase-cal was not off and amplitude somehow dropped for a half hour in E0009. No fringes in RCP channels in the "swapped" patching mode. This is the same problem as that happened in Bd.

Sv - Back to the X and K band experiments after a repair of its antenna problem.

Irbene also participated N12L3 and N12C3. Fringes to Irbene were only found in N12C3 RCP channels. As its receiver was not cooled yet, its sensitivity was not as high as it should be. Vladislavs Bezrukovs reported that Irbene has a SEFD of 750 Jy in LCP and 820 Jy in RCP with the current room-temperature receiver.

There were beautiful fringes to all the KVN stations in N12K4. Currently, the KVN stations provide a log file in a format different from that of FS log files. The ftp data have to be extracted manually and thus it is necessary to leave slightly longer gap (4 minutes is OK) for the KVN to do ftp-fringe tests. The KVN stations provided the antab files for the pipeline calibration. Their gain curves are opacity-corrected. The uvflg file will be available as well in the near future.

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