EVN Performance and Reliability

Olga Bayandina
[on behalf of EVN Support Scientists]

EVN TOG *zoom* meeting, 2020 November 24

NME Results & Feedback

2020 session 2: Summary

Arecibo: Fixed the problem with a significant clock offset between RCP and LCP.

Irbene: Successfully used continuous Tsys calibration for the first time. Accurate ANTAB file is provided.

Effelsberg: Linear polarization data in C/M band. Crossed polarization in N20K2.

Jodrell Bank: Problem with the FiLa10G; no fringes in N20K2 4G mode.

Mc, Nt, Sr, Tr, T6: Didn't participate due to maintenance / COVID-19 restrictions.

KVAZARs: gain curves were updated and corrected for all observations.

2020 session 3: Summary

Arecibo: Out of operation.

Badary: strong ripples in the LCP bandpass at K band.

Effelsberg: Linear polarization data in C/M band.

Hartebeesthoek: A leakage in the middle of the L-band found; was reported in previous L-band NMEs.

Jodrell Bank Mrk2: RCP bandpass showed a small-scale fast ripples at K band (reported last year).

KVN (Kt, Ky, Ku): During N20K3, showed fringes on baselines among themselves, but no clear fringes on baselines to other stations (large clock offset).

Noto: Did not participate.

Sardinia: Could not participate in N20M3 due to a problem with the DBBC; fixed after the NME.

Tianma, Urumqi, Kunming: *Could not participate due to ongoing national tasks.*

Westerbork: Several hardware issues since July that were resolved in October.

Zelenchukskaya: A problem with LCP in front-end receiver.

Summary: June 2020 - November 2020

🦠 **eMERLINs (+Jb), Ur, Nt, Mc, Sr, Ys:** Didn't participate due to COVID-19 restrictions

🔧 **Tr, Nt:** Didn't participate due to maintenance

🛰️ **T6, Ur, Km:** Could not participate due to ongoing national tasks

JIVE
Joint Institute for VLBI
ERIC
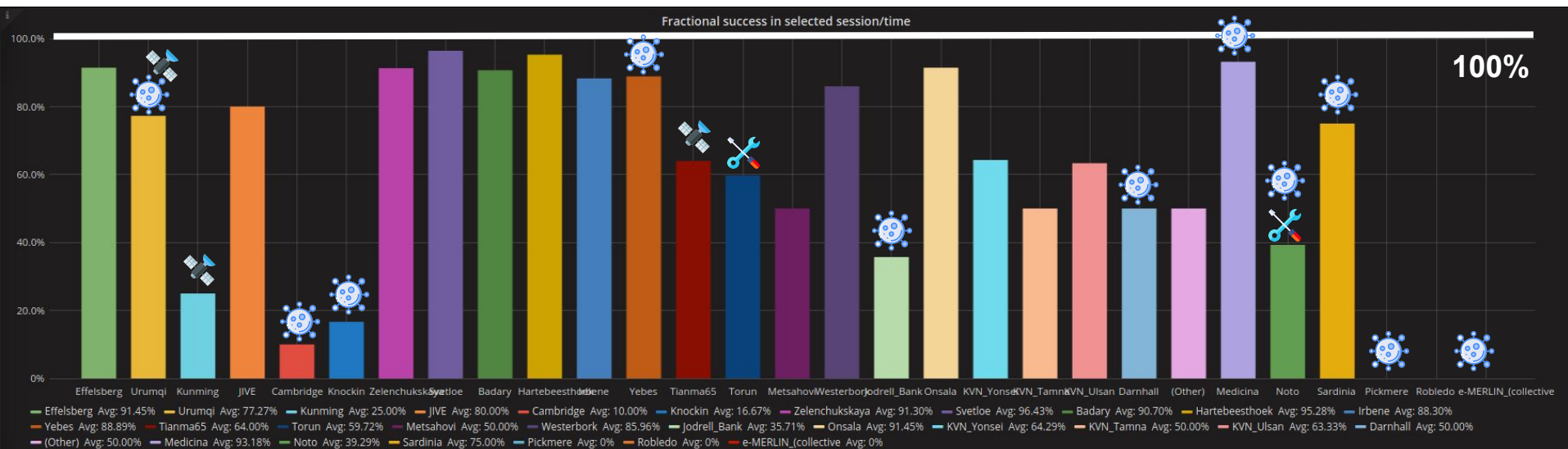
Station bandpasses

We moved to 32-MHz channels when possible because
the bandpasses are significantly flatter than the 16-MHz ones with firmware v107.

Hopes to still improve those?
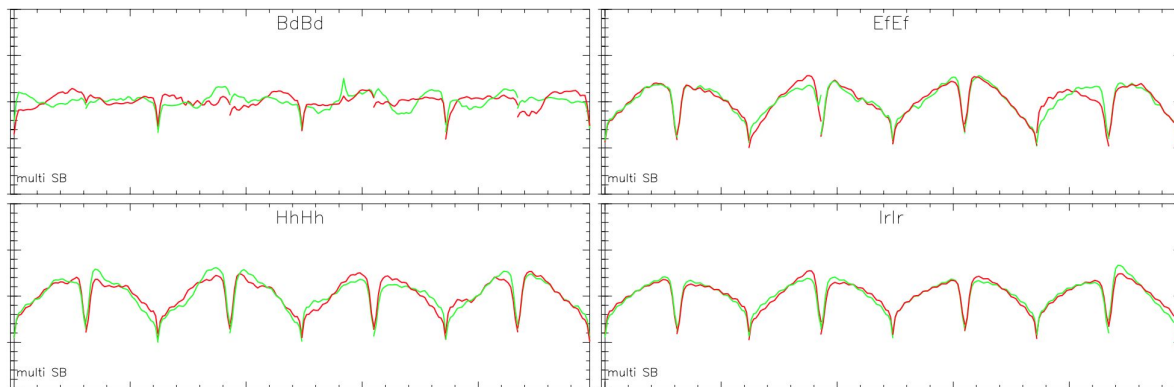
16 MHz
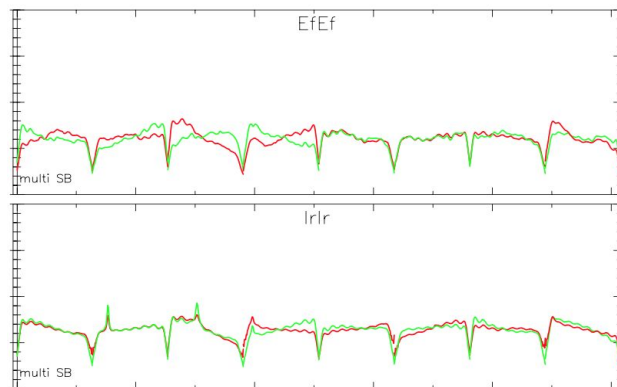
32 MHz

Yebes LL amplitude drops - DBBC2 problems?

Yebes showed some amplitude drops in some experiments during 2020 (e.g. EM140B in May; RSC07 in October). No linked to data loss.

LL-only BBCs 9-10?
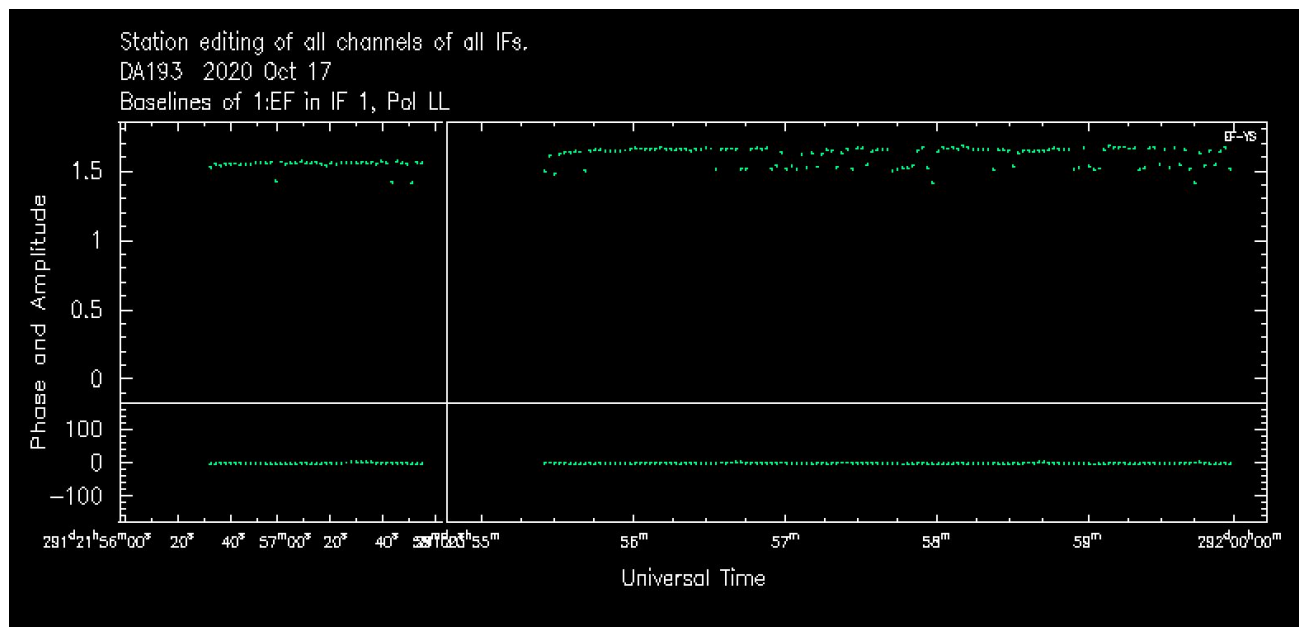
Amplitude calibration

Submission of ANTAB files

✅ **Irbene:** Successfully used continuous Tsys calibration for the first time.

❌ **Jodrell Bank:** Doesn't send ANTAB files in several experiments by default

❌ **Kunming:** No antab files (system does not support it). Thoughts to implement it?

❌ **Urumqi:** Antab files from the telescope have long been unavailable due to a problem with the script that generates them.

JIVE
Joint Institute for VLBI
ERIC

Submission of ANTAB files

	2020-2	2020-3	E-EVN
Ir	>30	5	1
T6	-	9	3
Tr	-	9	1
Ys	3	5	-
Ef	1	9	-
Sr	-	1	1
KVAZAR	10	6	-
KVN	3	9	-
Jb	>30	9	1
Ur	>30	-	-

Delay in days
between experiment and
ANTAB file upload

The number represents
the most delayed file

JIVE
Joint Institute for VLBI
ERIC

Antabfs.py – current issues

To all stations: Please use the latest version of antabfs.py!

**antabfs.py is now in the EVN GitHub repository
(https://github.com/evn-vlbi/VLBI-utilities)**
Several updates (mainly for fixes) have taken place

Bugs that remain open in the last version:
- Frequency range and BBC assignments: does not fully consider LSBs and bandwidths in many cases.
- ~~"60" seconds (or minutes) in some timestamps (e.g. 10:60 instead of 11:00).~~
- ~~Trailing commas in flat gain curves (observed in Effelsberg).~~
- ~~**IMPORTANT:** *If multiple rxg in the same directory: it does not compare the correct station*~~. *Now the station name needs to agree, or pass it manually.*

Median absolute error in gain calibration

Ar	Bd	Cm	Da	De	Ef	Hh	Ir	J1	J2	Km	Kn
0.048	0.12	0.09	0.11	0.12	0.06	0.19	0.15	N/A	0.09	N/A	0.15

Kt	Ku	Ky	Mc	Mh	Nt	O6	O8	Pi	Ro	Sr	Sv
N/A	N/A	N/A	0.06	N/A	0.60	N/A	0.06	0.12	N/A	0.3	0.3

T6	Tr	Ur	Wb	Ys	Zc						
0.11	0.10	0.4	0.16	N/A	0.13			**L-band**			

Ar	Bd	Cm	Da	De	Ef	Hh	Ir	J1	J2	Km	Kn
N/A	0.20	0.16	0.18	0.2	0.08	0.17	0.15	N/A	0.15	0.17	0.14

Kt	Ku	Ky	Mc	Mh	Nt	O6	O8	Pi	Ro	Sr	Sv
N/A	N/A	N/A	0.10	N/A	0.2	N/A	0.16	0.15	N/A	0.3	0.08

T6	Tr	Ur	Wb	Ys	Zc						
0.10	N/A	0.08	0.2	0.12	0.08			**C- & M-band**			

T6: the original gain corrections are consistently way off (~50%) from the ANTAB files; fixed during post-processing, so it is not reflected in the final (output) numbers here.

JIVE
Joint Institute for VLBI
ERIC

Median absolute error in gain calibration

Ar	Bd	Cm	Da	De	Ef	Hh	Ir	J1	J2	Km	Kn
N/A	0.04	N/A	N/A	N/A	0.04	0.046	0.06	N/A	N/A	N/A	N/A

Kt	Ku	Ky	Mc	Mh	Nt	O6	O8	Pi	Ro	Sr	Sv
N/A	N/A	N/A	N/A	N/A	N/A	0.06	N/A	N/A	N/A	N/A	0.4

T6	Tr	Ur	Wb	Ys	Zc	
N/A	N/A	0.50	0.2	0.03	0.11	**X-band**

Ar	Bd	Cm	Da	De	Ef	Hh	Ir	J1	J2	Km	Kn
N/A	0.4	N/A	N/A	N/A	0.09	0.08	N/A	N/A	0.3	N/A	N/A

Kt	Ku	Ky	Mc	Mh	Nt	O6	O8	Pi	Ro	Sr	Sv
0.3	0.46	0.3	N/A	0.2	N/A	0.12	N/A	N/A	N/A	N/A	0.15

T6	Tr	Ur	Wb	Ys	Zc	
N/A	N/A	0.08	N/A	0.10	0.3	**K-band**

Median absolute error in gain calibration

Station feedback plots in Grafana:

Are stations interested in obtaining their gain calibration (previous plots) with the absolute corrections (instead of the relative ones)?

+ adds information about under/over estimating the amplitudes
- will break compatibility with the existing data in the database

Improvements achieved!

⭐ Successful 4 Gbps tests

⭐ **We keep operations running during the COVID-19 pandemic!
Thank you everyone for your efforts on that!**

JIVE
Joint Institute for VLBI
ERIC

Requests / Suggestions

- ❏ No antab files from **Urumqi** and **Kunming**: system implementations?

- ❏ Upload the ANTAB files… Do not wait for our email!

- ❏ Could stations get weather measurements and write them into the log files?

JIVE
Joint Institute for VLBI
ERIC

Kind requests from Support Scientists

❏   Join chat during NMEs and e-EVN runs

❏   Station feedback (and detailed)! (use of "cause of the problems" options?)

❏   Upload log files to vlbeer (every time less files…)

❏   Upload ANTAB files to vlbeer after the observations (and check them beforehand, inform us about issues)

❏   Update your local scripts (e.g. antabfs.py)

❏   Be responsive to emails and provide feedback!

JIVE
Joint Institute for VLBI
ERIC