EVN Performance and Reliability

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[on behalf of EVN Support Scientists]

JIVE

EVN TOG *zoom* meeting, 2019 May 5

NME Results & Feedback

2019 session 3: Summary

Arecibo: No fringes. Wrong sample stats.

Effelsberg: Linear polarization data in C/M band. Problem with switching modes in the S/X band.

KVN: High rates for K band data. [Fixed]

2020 session 1: Summary

Arecibo: Fixed previous problems. Fringes found to both RCP and LCP, but a significant clock offset is found between the two polarizations.

e-MERLIN:
  Defford; Cambridge; Knockin: Could not participate in the session after a fibre break on the antennas' site.
  Pickmere: Out for the entire EVN session; stopped for a cooled C band PAF testing.

Effelsberg: Linear polarization data in C/M band. Problem with switching modes in multiple NMEs.

Hartebeesthoek: Started to use continuous Tsys calibration.

Svetloe: problems to send the FTP data during NME (routing through other KVAZARs). Unclear reasons? Transference dropped several times from 1 Gbps to 4 Mbps during e-EVN runs. Provider issues?
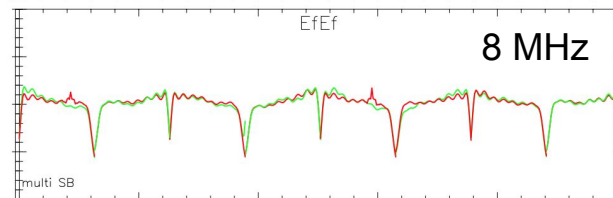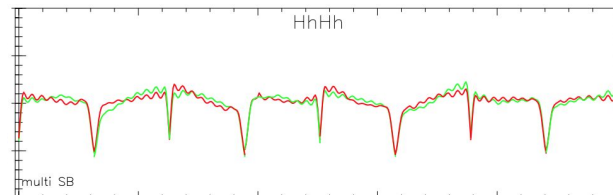
Urumqi: Could not participate in the session due to COVID-19 restrictions.
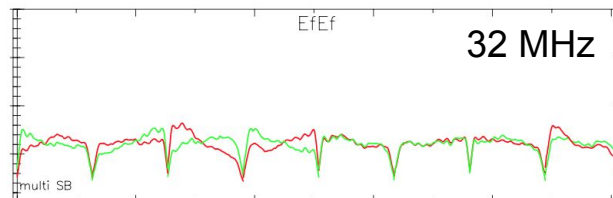
Westerbork: Cannot observe at 13cm.

Station bandpasses

Good shapes for 8 and 32 MHz channels (512 and 2048 Mbps).
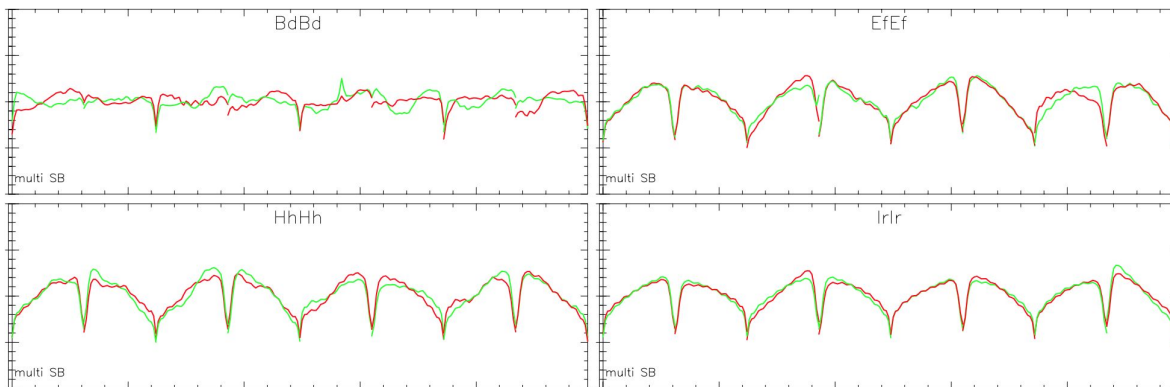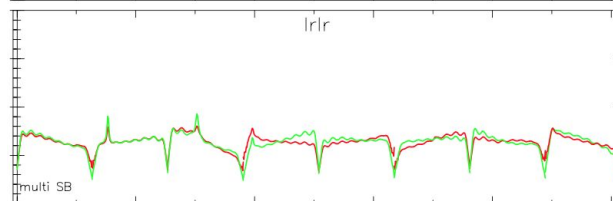Far from optimal for 16 MHz (standard 1024 Mbps experiments).

Can it be improved? Should we use 8x32 MHz channel then?
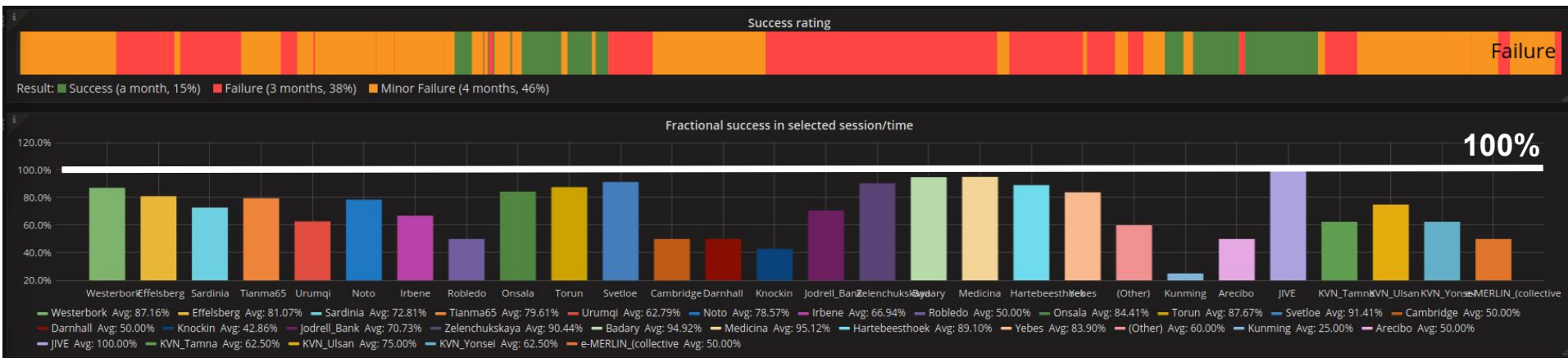

8 MHz

32 MHz

16 MHz

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Summary: August 2019 - May 2020

Green: success (15%)
Orange: minor failures (46%)
Red: failures during observations (38%)

Amplitude calibration

Submission of ANTAB files

☑ **In the last session we received all ANTABs for all stations in quite a lot number of experiments [has never happened before!]**

☑ **Hartebeesthoek:** Started to use continuous Tsys calibration.
☑ **KVAZAR:** Started to record TPI values (not only TPIcal).

✖ **Jodrell Bank:** Stopped sending ANTAB files from the telescope recently (last session), all hardware at JBO has been shut down as part of the University of Manchester's response to the COVID-19 pandemic.
✖ **Kunming:** No antab files (system does not support it). Thoughts to implement it?
✖ **Tianma:** no log files uploaded for several experiments.
✖ **Urumqi:** Antab files from the telescope have long been unavailable due to a problem with the script that generates them.

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Submission of ANTAB files

	2019-3	2020-1	E-EVN
Ir		7	
T6	3	1	2
Tr	0	2	2
Ys	1		
Ef		0	
Sr		0	
KVAZAR		1	4
KVN		1	
Jb1		?	?
Mc	1		

Delays in days
since ANTAB files
were requested.

Multiple experiments
from the same session
are clustered in one value.

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ANTAB processing program

**New handy tool for inspection* of ANTAB files
(created by B. Eldering at JIVE)**

- Time-saving
- Easy data visualization
- Data cross checking

An issue with KVAZAR stations' gain curves discovered
[and already fixed!]
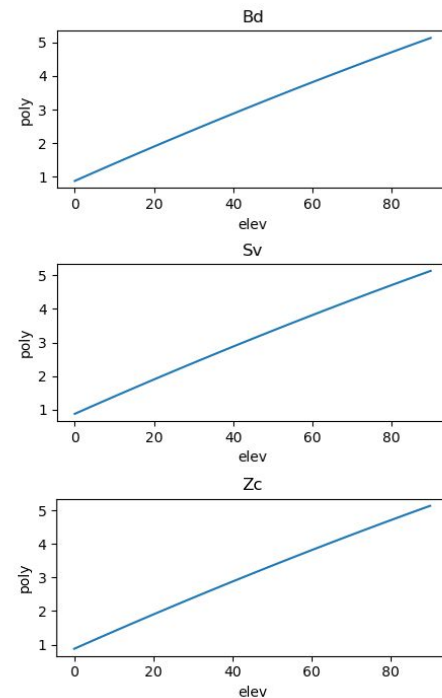
⚠ **Disclaimer** The program is aimed to inspect ANTAB files, not to create them. Telescopes still need to produce ANTAB files!

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Antabfs.py – current issues

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

Bugs that remain open in the last version:
- Frequency range: 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).
- **IMPORTANT:** *If multiple rxg in the same directory: it does not compare the correct station*.

Move antabfs.py from the MPI website to the EVN GitHub?
To keep record of current bugs, fixes, and issues.
It also allows pull requests from other people helping to improve it.
Status at Yebes?

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Median absolute error in gain calibration

	BD	EF	HH	IR	J1	J2	KM	KT	KU	KY	MC	MH
	0.18	0.10	0.13	0.15	0.12	0.12	0.3	0.4	0.4	0.4	0.10	0.2

NT	O6	O8	RO	SR	SV	T6	TR	UR	WB	YS	ZC
0.4	0.3	0.10	N/A	0.2	0.3	0.3	0.12	0.3	0.14	0.17	0.2

Average for all frequencies for **2019 session 3** and a few experiments from **2020 session 1**.

- Gain calibration improved in the last sessions.
- Some L-band observations strongly affected by RFI interfering in the values (e.g. **Nt**).
- K-band observations still with unreliable values. *Still in the list: How to perform opacity corrections*?
- **KVAZAR** stations significantly improved in 2020 Session 1 (not reflected here yet).
- Still high scatter typically seen in: **T6, Ir, Ur**.

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Improvements achieved!

- **Hartebeesthoek** started to use continuous Tsys calibration

- **KVAZARs** writing TPI values in the ANTAB files and quick fix on gain curves.

- **Arecibo** fixed previous problems, fringes!

- Successful 4 Gbps M-band test

- First successful 8 Gbps fringes (X-band)

- **We keep operations running during the COVID-19 pandemic!**

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Need to Improve

- ❏   No antab files from **Jodrell Bank** station… no steps back!

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

- ❏   Still in the process of resolving problems with **Arecibo** (clock offset)

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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!

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