EVN Performance and Reliability

Junghwan Oh
[on behalf of Support Scientists]

EVN TOG 24 Jan 2023

2022 Session 1 : Summary

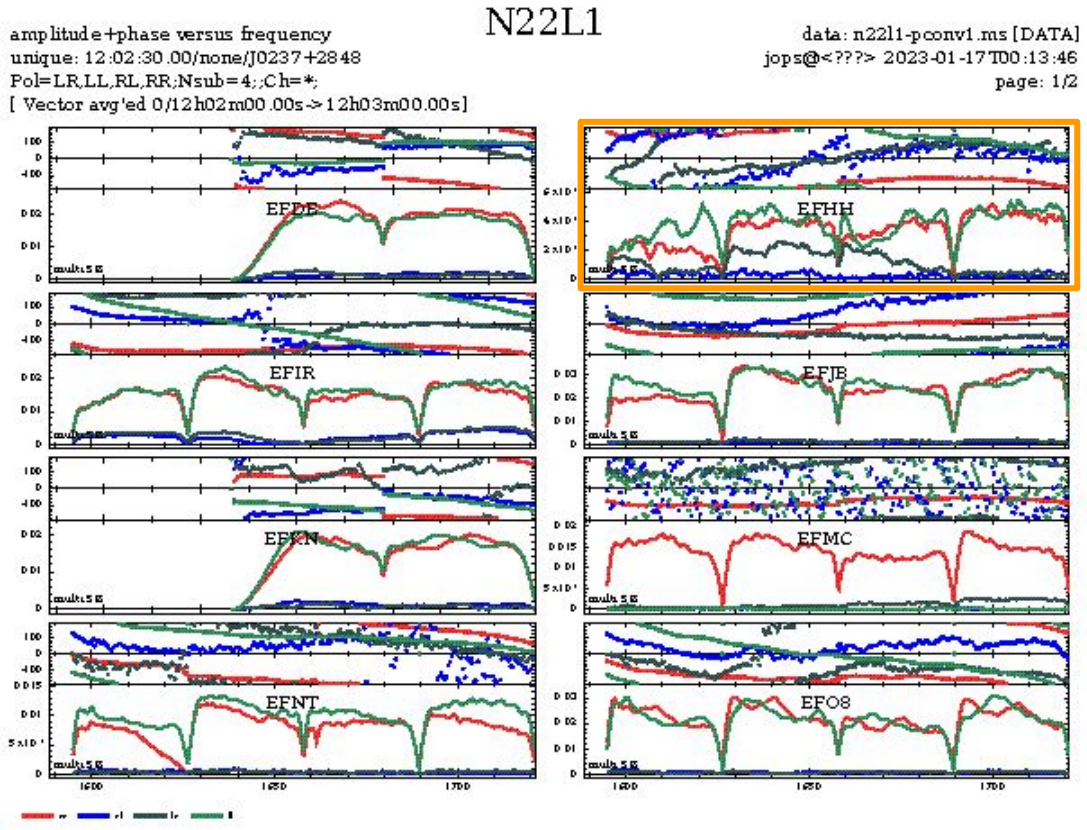
- **Ir** : 32m out for session, only 16m used
- **Nt** : Out for C (6cm receiver not available)
- **Tr** : Phase jump reported

- N22L1
  - **Ur** : out for IVS observations
  - **FAST** participated without file transfer
  - **Hh** : Polarisation leakage?
- N22C1
  - No fringes to **Km** (**Kd**), No data shipped
- N22Q1 : absolute astrometry in phase-referencing mode
  - **Ur** : out for national task
  - **Kt** : Issues when transferring data during the FTP test (time offset)

2022 Session 1 : Summary

- **Ir** : 32m out for session, only 16r
- **Nt** : Out for C (6cm receiver not
- **Tr** : Phase jump reported

- N22L1
  - **Ur** : out for IVS observations
  - **FAST** participated without file trans
  - **Hh** : Polarisation leakage?
- N22C1
  - No fringes to **Km** (**Kd**), No data ship
- N22Q1 : absolute astrometry in
  - **Ur** : out for national task
  - **Kt** : Issues when transferring data c



JIVE
Joint Institute for VLBI ERIC

2022 Session 1 : Summary

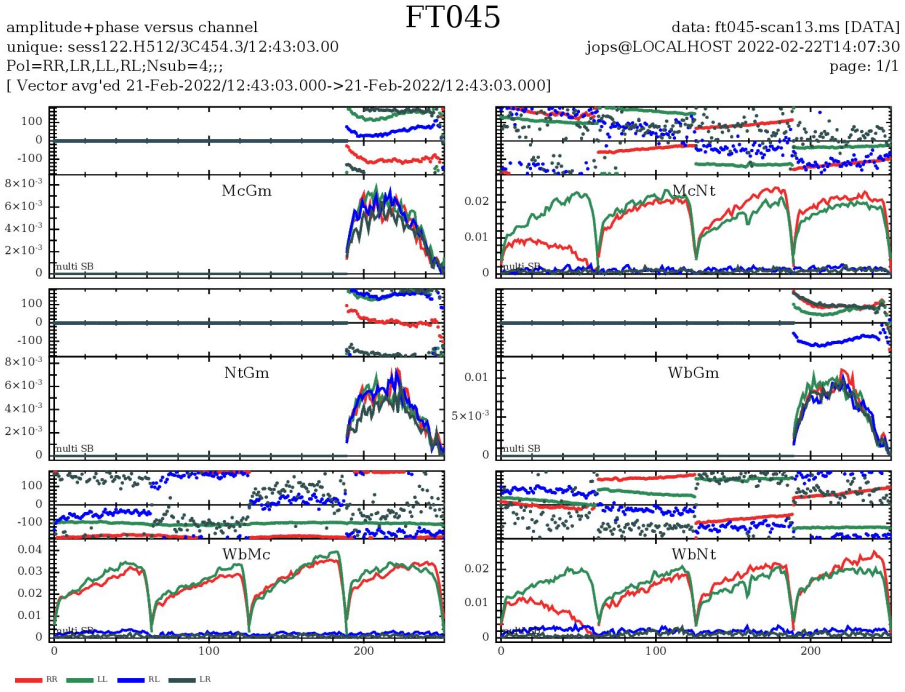
- **Ir** : 32m out for session, only 16m used
- **Nt** : Out for C (6cm receiver not available)
- **Tr** : Phase jump reported

- N22L1
  - **Ur** : out for IVS observations
  - **FAST** participated without file transfer
  - **Hh** : Polarisation leakage?
- N22C1
  - No fringes to **Km** (**Kd**), No data shipped
- N22Q1 : absolute astrometry in phase-referencing mode
  - **Ur** : out for national task
  - **Kt** : Issues when transferring data during the FTP test (time offset)

Fringe test with GMRT

FT044 128 Mbps 1 BBC 16 MHz filters 2-bit sampling

FT045 512 Mbps 8 BBC 16 MHz filters 2-bit sampling



JIVE
Joint Institute for VLBI ERIC

2022 Session 2 : Summary

- **Ib** : missed all NME & most of e-evn (maintenance)
- **Km** : could not participate for the whole session (Antenna problem)
- Quasar stations stop participating
- **Tr** : Phase instability still found

- N22L2
  - **O8** : windstowed
  - **Nt** : Hardware failure
- N22C2
  - No fringes to **Nt** (LO problem?)

2022 Session 3 : Summary

- **Ir** : could not participate (Broken maser)
- **Km** : could not participate for whole session (Az-bearing issues.)
- KVN in 4 Gbps mode
- Highest number of experiments! (41 science obs)

- N22L3
  - **Ur** : could not participate (L band receiver unmounted)
- N22K1
  - **Tr** : could not participate (receiver)
  - **Nt** : Problem in LCP (1st half of the band)
  - **Ku** : weight ~0.25

2022 Session 3 : Summary

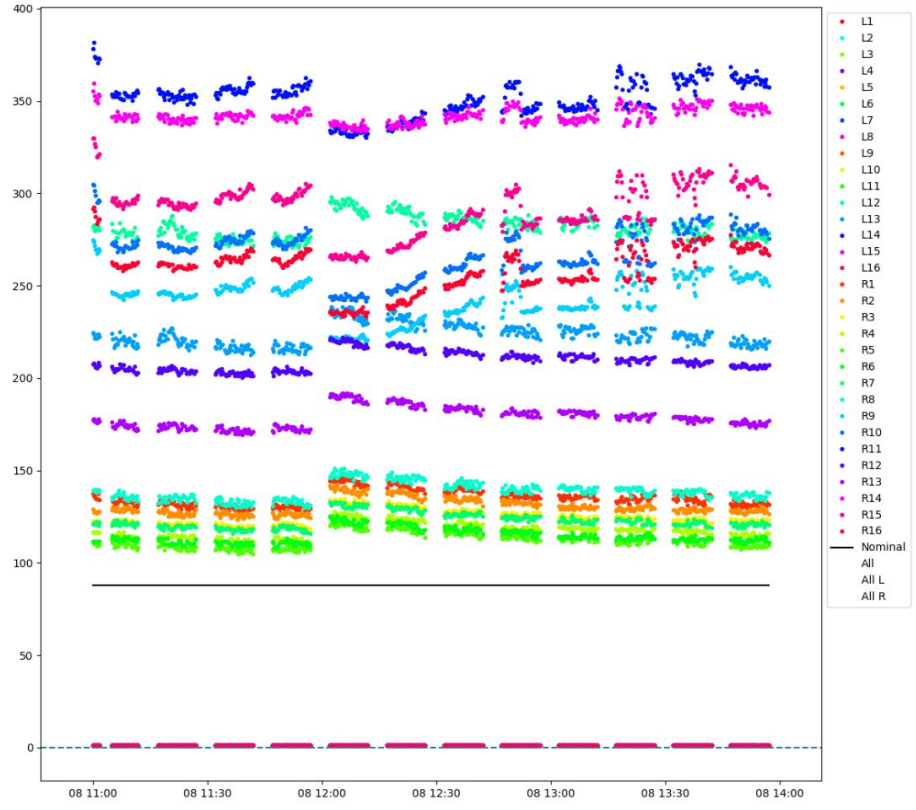
- **Ir** : could not participate (Broken maser)
- **Km** : could not participate for whole session (Az-beari
- KVN in 4 Gbps mode
- Highest number of experiments! (41 science obs)

- N22L3
  - **Ur** : could not participate (L band receiver unmounted)
- N22K1
  - **Tr** : could not participate (receiver)
  - **Nt** : Problem in LCP (1st half of the band)
  - **Ku** : weight ~0.25

Ef-Mc	Ef-Mh	Ef-Nt	Ef-Oo	Ef-Pi	Ef-To	Ef-Ur	Ef-Ys
60.4AP offset: 2	60.8AP offset: -2	70.3AP offset: -3	106.3AP offset: 0		97.8AP offset: -1		195.5AP offset: 0
4.6AP offset: 0	13.1AP offset: 0	3.8AP offset: -14	19.5AP offset: -1		17.4AP offset: -1		39.3AP offset: 0
29.9AP offset: 0	48.1AP offset: -2	3.8AP offset: -11	84.7AP offset: -1		86.4AP offset: 0		194.7AP offset: 1
11.0AP offset: 3	16.5AP offset: -1	11.6AP offset: -2	11.2AP offset: -2		10.1AP offset: 0		41.2AP offset: -1
133.4AP offset: 1	60.3AP offset: 0	153.0AP offset: 2	105.3AP offset: -1		83.8AP offset: 1		185.8AP offset: 1
23.7AP offset: 1	14.9AP offset: 1	4.0AP offset: 7	16.6AP offset: 2		15.8AP offset: 0		31.5AP offset: 1
137.0AP offset: 1	54.6AP offset: 0	4.5AP offset: 2	99.1AP offset: 2		86.7AP offset: 1		204.3AP offset: 1
28.4AP offset: 0	15.8AP offset: 1	16.4AP offset: 3	13.5AP offset: 0		9.2AP offset: 0		41.0AP offset: 0
124.4AP offset: 0	49.1AP offset: -1	88.1AP offset: -2	78.8AP offset: 0		64.0AP offset: -1		166.5AP offset: -1
19.2AP offset: 0	12.2AP offset: -1	2.9AP offset: -20	11.3AP offset: 0		15.7AP offset: -1		17.6AP offset: -1
138.1AP offset: 0	42.6AP offset: -1	3.8AP offset: 17	77.9AP offset: -1		53.6AP offset: -1		149.7AP offset: 0
24.6AP offset: 0	11.7AP offset: 0	11.5AP offset: -2	13.5AP offset: 1		8.1AP offset: 0		28.9AP offset: -1
191.9AP offset: 0	50.3AP offset: 0	130.4AP offset: 1	93.4AP offset: 0		76.0AP offset: 0		173.2AP offset: 1
17.7AP offset: 1	17.9AP offset: 1	3.7AP offset: 3	14.9AP offset: 2		14.7AP offset: -1		20.3AP offset: 1
159.6AP offset: 1	43.3AP offset: 0	3.4AP offset: -14	107.3AP offset: 1		67.5AP offset: 0		219.3AP offset: -1
19.8AP offset: 1	12.1AP offset: 0	14.9AP offset: 2	16.9AP offset: -1		7.5AP offset: 0		16.9AP offset: 0
147.0AP offset: -1	66.3AP offset: 0	145.0AP offset: -2	92.0AP offset: 2		78.7AP offset: 0		234.0AP offset: 0
19.9AP offset: 0	16.7AP offset: 0	4.4AP offset: -5	16.2AP offset: 0		11.2AP offset: 1		39.7AP offset: 1
158.8AP offset: 0	70.5AP offset: 0	4.7AP offset: -4	97.0AP offset: -1		60.1AP offset: 1		213.5AP offset: 0
31.4AP offset: -1	8.6AP offset: -1	12.9AP offset: -1	13.1AP offset: 1		7.2AP offset: 0		12.0AP offset: 0

JIVE
Joint Institute for VLBI ERIC

Nt antab N22K1



STATION	NT	STATION	NT
DPFU	0.1126, 0.107411	FT	1.0
FREQ	21976.0, 22520.0	TIMEOFF	0.0
POLY	0.72337815, 0.0099293287, -8.91032e-05	INDEX	R5', 'R6', 'R7', 'R8', 'R9', 'R10', 'R11', 'R12', 'R13', 'R14', 'R15', 'R16'

Edit

Fill missing values in all columns by interpolating — Go

Add time stamps at least once per scan — Go

Multiply selected TSYS values by — Go

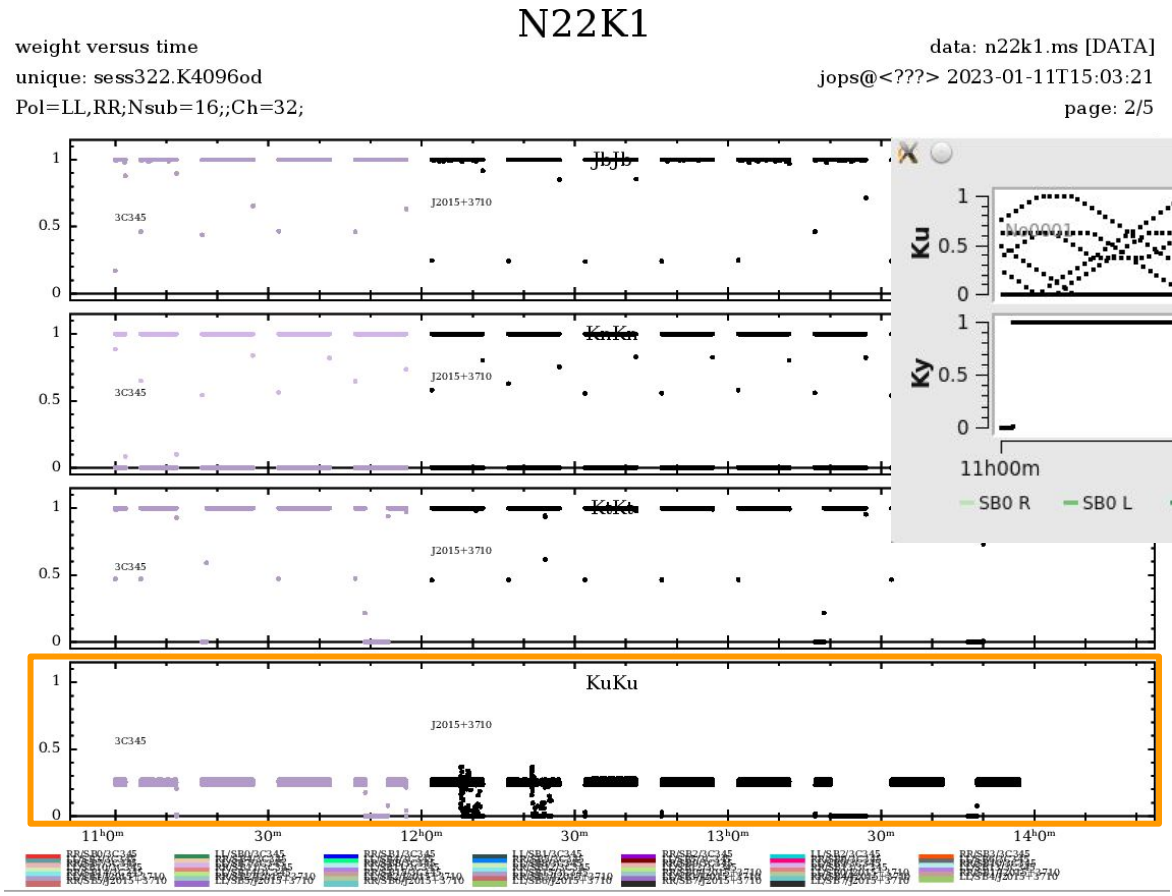
Remove empty timestamps | Merge equal channels | Split channels

Save | Undo last changes | Resize columns

	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	R1	R2	R3	R4	R5	R6	R7	R8	R9
2022-11-08 11:00:01	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	282.0	224.6	1.0	1.0	1.0	137.4	128.9	122.5	116.6	111.6	111.7	121.0	139.3	274.6
2022-11-08 11:00:15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	282.7	223.7	1.0	1.0	1.0	136.3	127.3	122.4	116.4	110.5	111.3	120.9	138.7	273.7
2022-11-08 11:00:30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	279.6	221.4	1.0	1.0	1.0	136.4	127.8	122.7	116.9	110.4	111.5	122.0	139.5	271.5
2022-11-08 11:00:45	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	280.0	221.8	1.0	1.0	1.0	135.1	127.3	122.3	116.5	110.3	111.8	120.8	138.9	269.7
2022-11-08 11:01:00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	280.1	221.8	1.0	1.0	1.0	134.6	126.9	122.8	116.3	108.9	111.5	122.2	139.5	267.4
2022-11-08 11:01:15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	281.8	223.6	1.0	1.0	1.0	134.6	127.7	122.2	116.7	110.0	111.7	121.3	139.2	267.7
2022-11-08 11:01:30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	281.7	223.7	1.0	1.0	1.0	137.6	127.6	121.6	116.3	111.1	111.0	120.2	138.3	269.8
2022-11-08 11:01:45	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	280.4	222.3	1.0	1.0	1.0	134.3	127.7	122.5	116.4	109.5	111.8	121.6	139.1	269.3
2022-11-08 11:05:01	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	283.6	224.0	1.0	1.0	1.0	135.2	128.5	121.8	115.0	111.4	113.1	120.1	135.5	246.7
2022-11-08 11:05:15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	279.8	221.0	1.0	1.0	1.0	133.2	130.3	122.5	113.9	110.6	114.4	121.5	134.7	246.0
2022-11-08 11:05:30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	273.7	216.7	1.0	1.0	1.0	130.9	128.7	123.1	114.7	108.2	113.8	123.1	136.4	245.8
2022-11-08 11:05:45	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	274.2	217.6	1.0	1.0	1.0	131.4	128.2	122.0	114.4	108.9	112.4	121.5	135.9	245.8
2022-11-08 11:06:00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	279.1	221.5	1.0	1.0	1.0	133.0	129.0	121.8	114.4	109.4	112.7	120.7	136.4	245.2
2022-11-08 11:06:15	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	276.1	218.7	1.0	1.0	1.0	132.8	128.3	122.8	115.5	108.9	112.2	122.4	137.2	245.5
2022-11-08 11:06:30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	276.0	218.3	1.0	1.0	1.0	132.6	130.1	123.7	114.7	108.7	114.2	123.2	137.3	244.9
2022-11-08 11:06:45	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	278.5	220.3	1.0	1.0	1.0	133.8	127.7	123.2	116.9	109.9	111.6	122.4	139.1	244.0
2022-11-08 11:07:00	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	283.9	224.9	1.0	1.0	1.0	135.5	127.6	121.7	116.1	111.9	112.5	119.9	136.7	244.2
2022-11-08 11:07:30	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	279.6	221.3	1.0	1.0	1.0	133.5	129.1	122.6	115.2	110.3	112.8	121.4	136.8	244.6
2022-11-08 11:07:45	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	280.0	221.8	1.0	1.0	1.0	135.4	129.6	123.3	116.2	111.2	113.5	122.4	137.6	242.8

JIVE
Joint Institute for VLBI ERIC

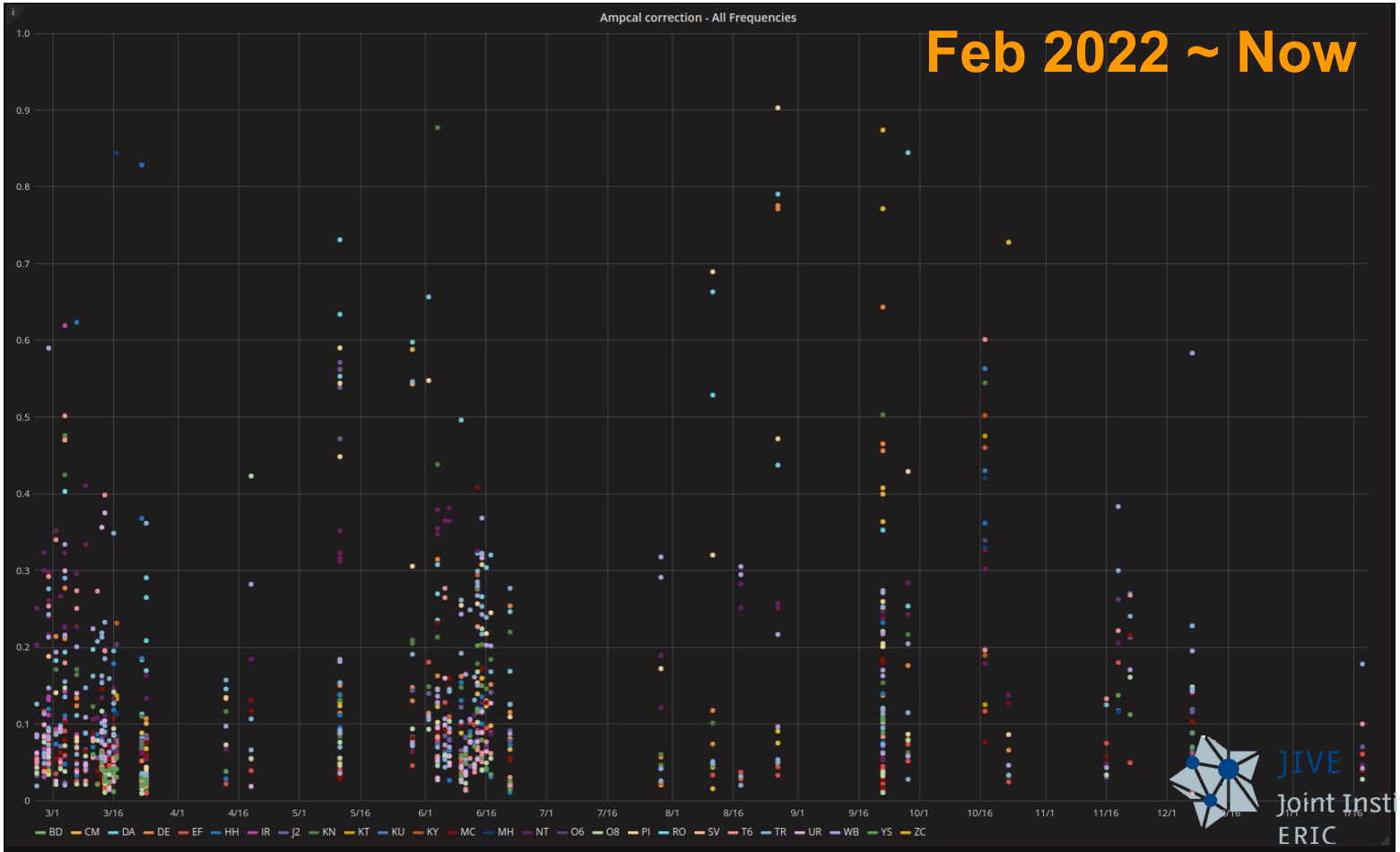
Ku N22K1



1/16 sec integration

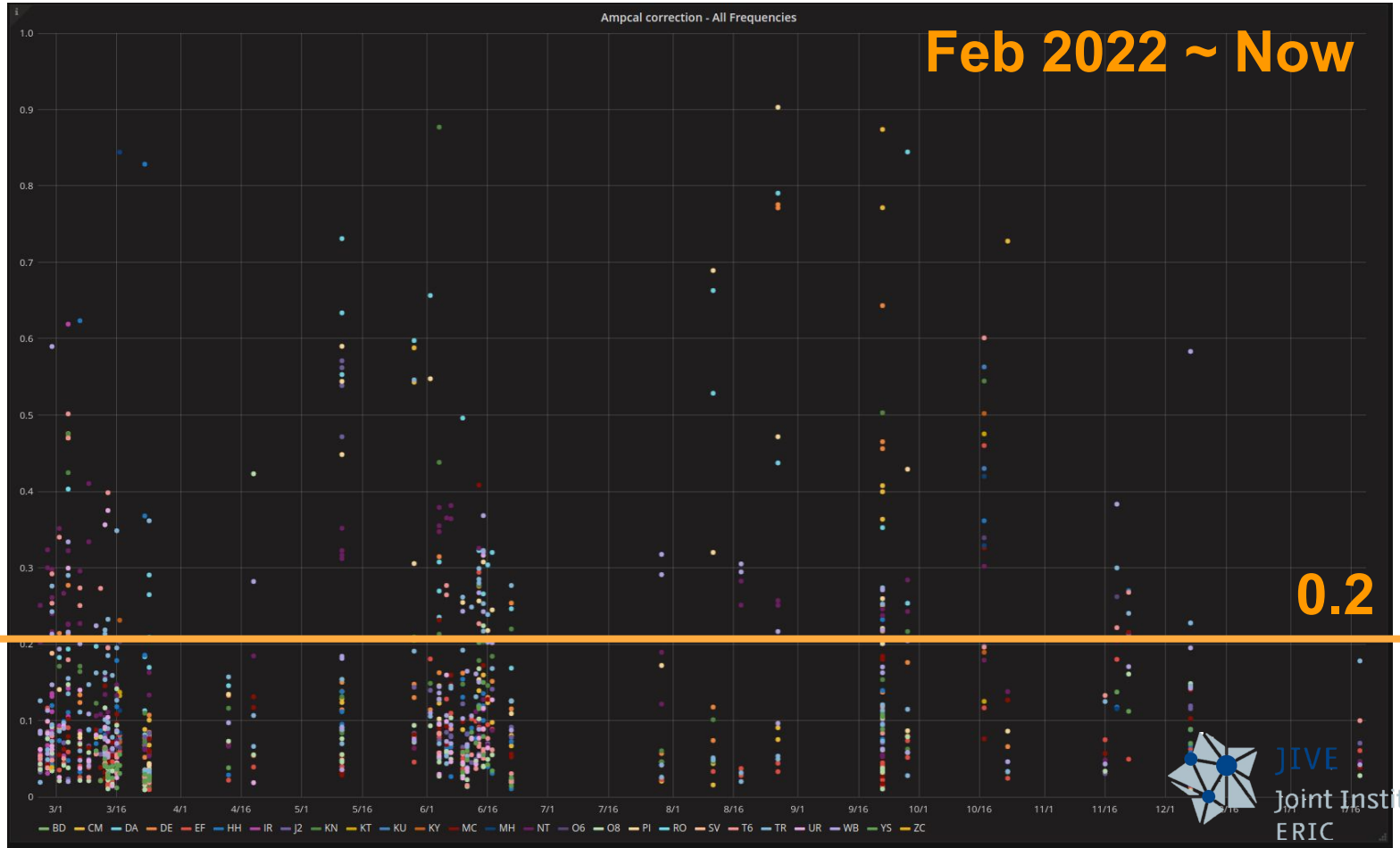
JIVE
Joint Institute for VLBI ERIC

Median absolute error in gain calibration

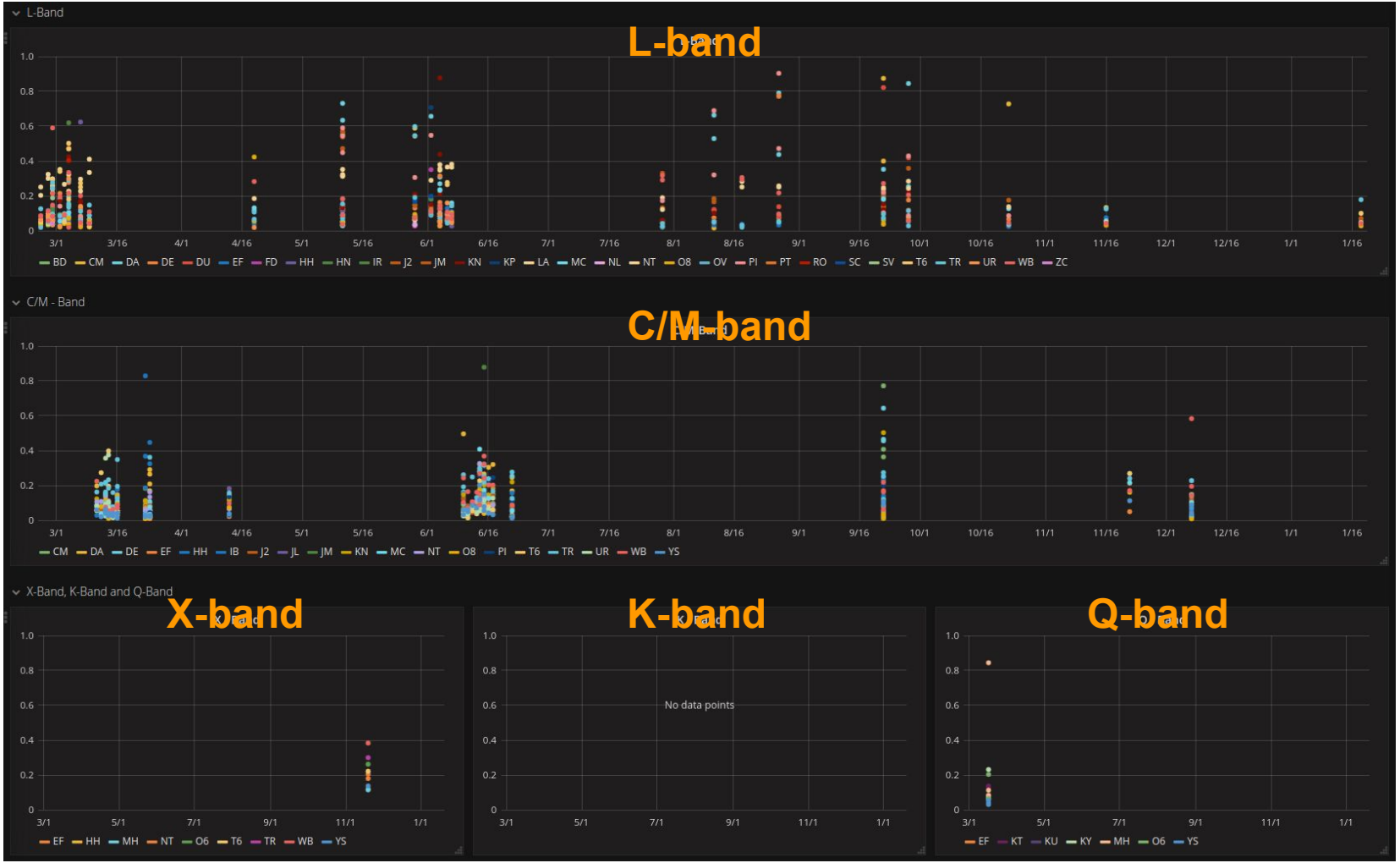


JIVE
Joint Institute for VLBI ERIC

Median absolute error in gain calibration



JIVE
Joint Institute for VLBI ERIC


L-Band
L-band
1.0
0.8
0.6
0.4
0.2
0
3/1
3/16
4/1
4/16
5/1
5/16
6/1
6/16
7/1
7/16
8/1
8/16
9/1
9/16
10/1
10/16
11/1
11/16
12/1
12/16
1/1
1/16
BD CM DA DE DU EF FD HH HN IR J2 JM KN KP LA MC NL NT O8 OV PI PT RO SC SV T6 TR UR WB ZC
C/M - Band
C/M-band
CM DA DE EF HH IB J2 JL JM KN MC NT O8 PI T6 TR UR WB YS
X-Band, K-Band and Q-Band
X-band
EF HH MH NT O6 T6 TR WB YS
K-band
No data points
Q-band
EF KT KU KY MH O6 YS


Bd 0.07
Cm 0.3
Da 0.45
De 0.20
Ef 0.057
Hh 0.10
Ir 0.12
J2 0.13
Kn 0.2
Mc 0.09
Nt 0.3
O8 0.07
Pi 0.3
Ro 0.4
Sv 0.19
T6 0.16
Tr 0.11
Ur 0.08
Wb 0.15
Zc 0.04
L-band
Cm 0.17
Da 0.2
De 0.18
Ef 0.051
Hh 0.12
J2 0.08
Kn 0.14
Mc 0.07
Nt 0.10
O8 0.058
Pi 0.14
T6 0.08
Tr 0.17
Ur 0.10
Wb 0.16
Ys 0.056
C/M-band
Ef 0.18
Hh 0.12
Mh 0.12
Nt 0.2
O6 0.3
T6 0.2
Tr 0.3
Wb 0.4
Ys 0.14
X-band

ANTAB files

Please check the values before sending them (or leave notes)

Ef : Empty file after changing setups

Ur : Bad entries or null-size file

T6 : Bad entries

Wb : Strange step-function-like entries

ANTAB files

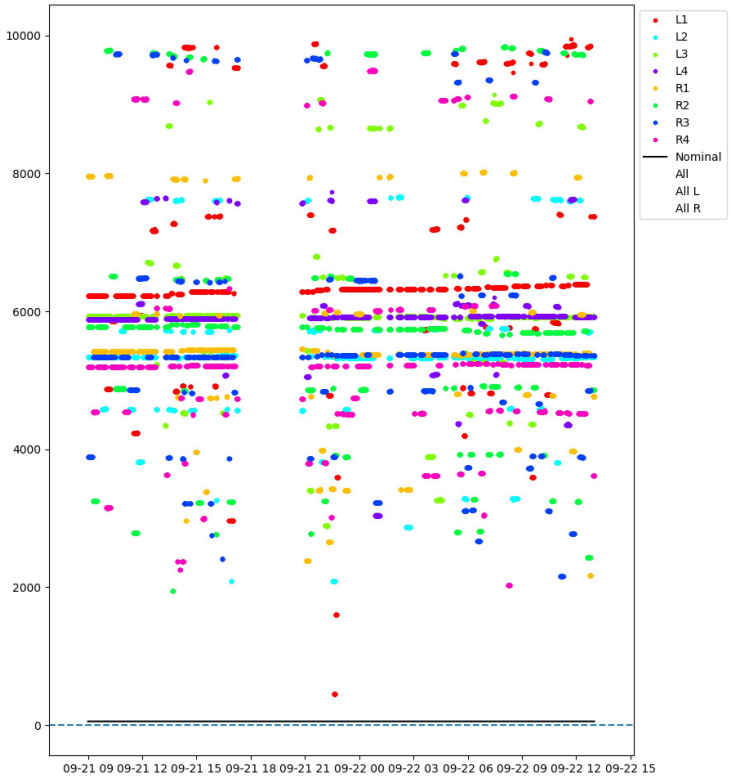
Please check the values before sending them (or leave notes)

Ef : Empty file after changing setups

Ur : Bad entries or null-size file

Wb : Strange step-function-like entries

T6 : Bad entries



ANTAB files

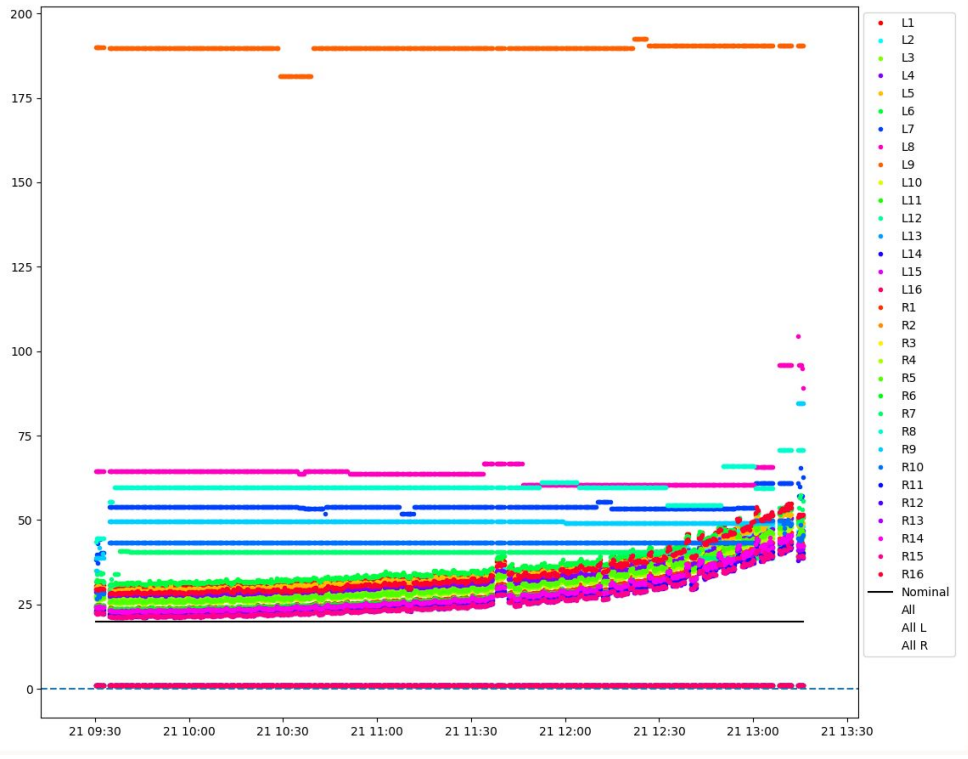
Please check the values before sending them (or leave notes)

Ef : Empty file after changing setups

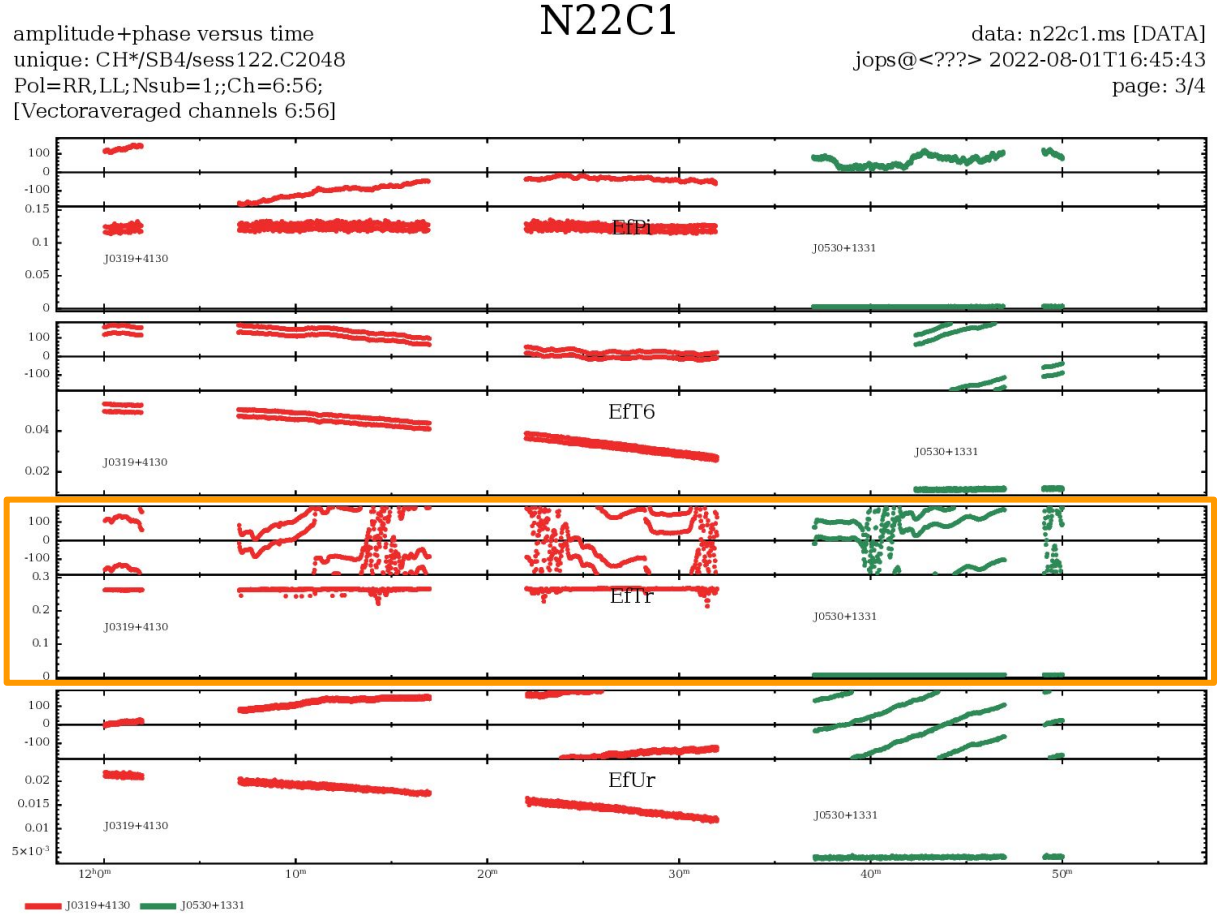
Ur : Bad entries or null-size file

Wb : Strange step-function-like entries

T6 : Bad entries

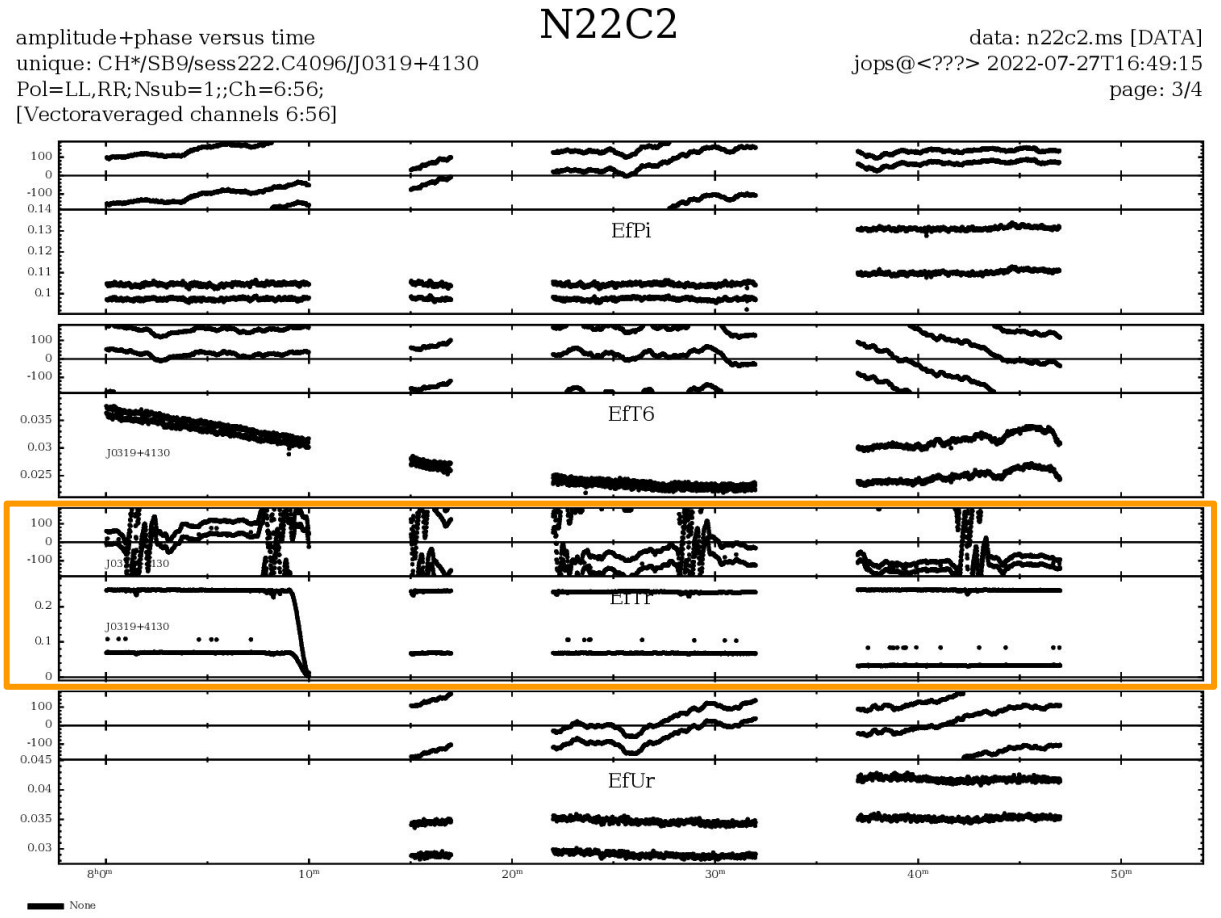


Issues : Tr phase jumps



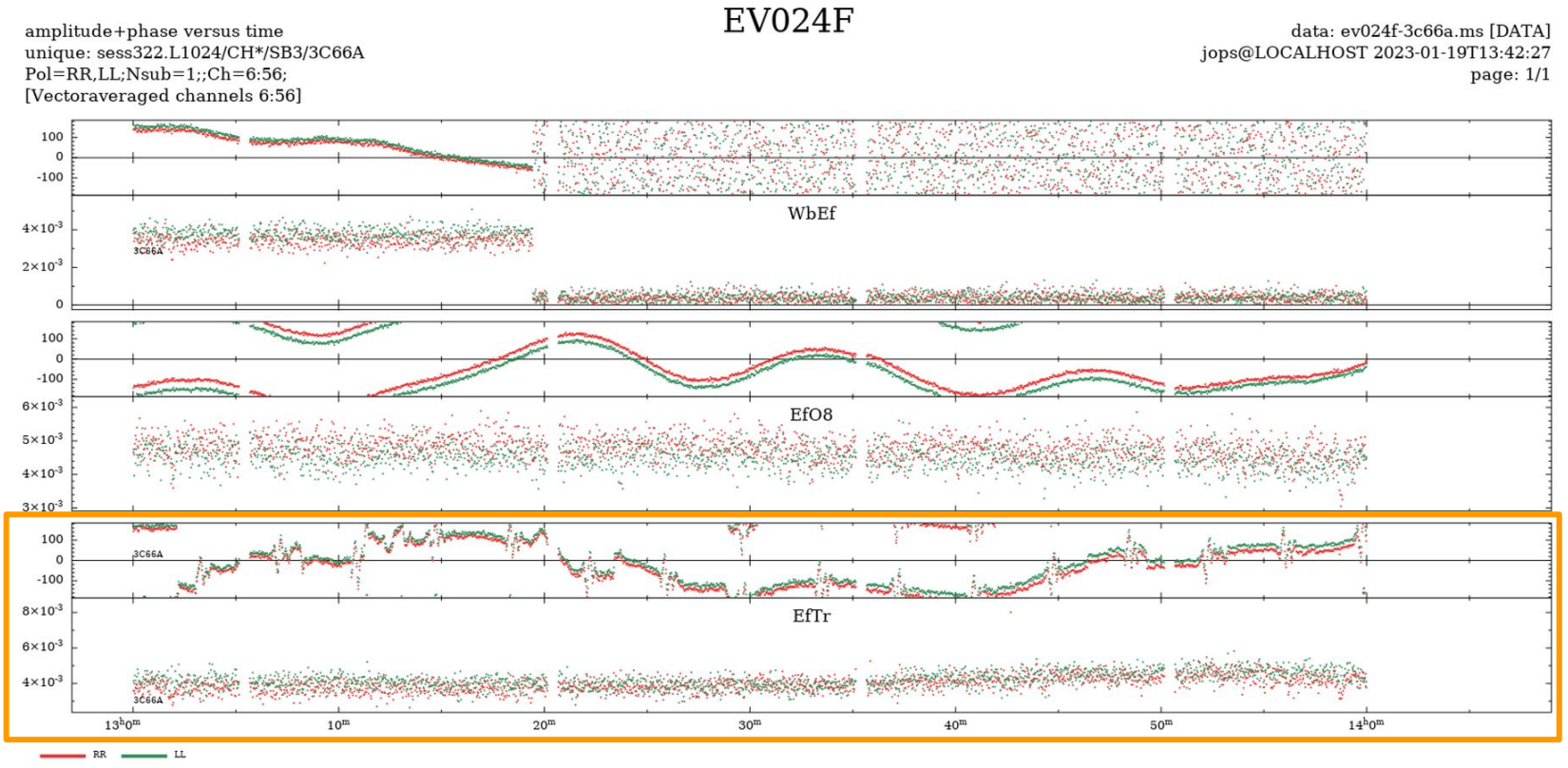
JIVE
Joint Institute for VLBI ERIC

Issues : Tr phase jumps



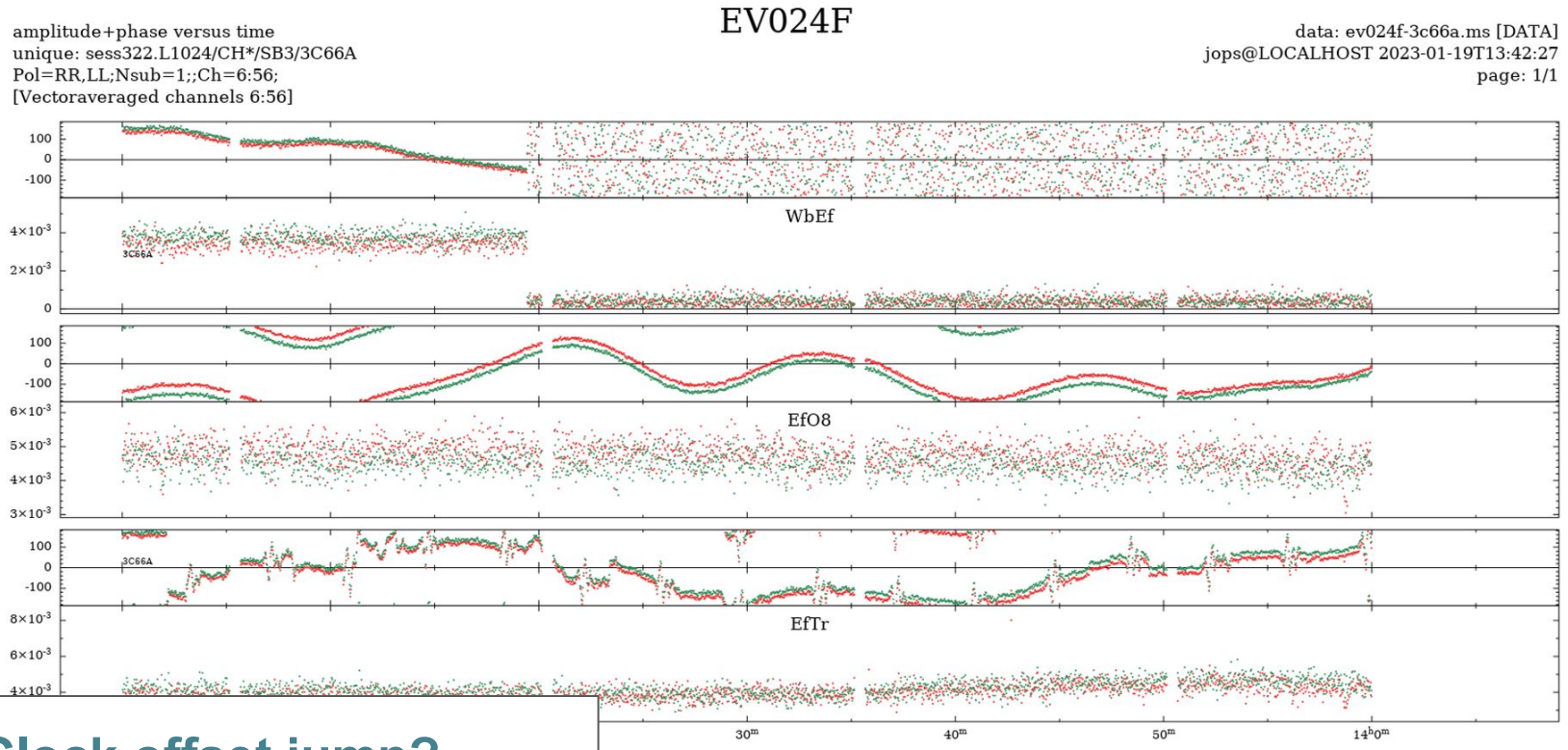
JIVE
Joint Institute for VLBI ERIC

Issues : Tr phase jumps



JIVE
Joint Institute for VLBI ERIC

Issues : Tr phase jumps



Clock offset jump? between e-evn obs.

JIVE
Joint Institute for VLBI ERIC

Issues : Sampler stats (out-stations)

Da	- -	- +	+ -	+ +	invalid
4958.49MHz, LSB, RCP	36.93%	13.04%	12.99%	36.64%	0.40%
4958.49MHz, LSB, LCP	39.47%	10.43%	10.42%	39.28%	0.40%
4958.49MHz, USB, RCP	36.93%	13.04%	12.99%	36.64%	0.40%
4958.49MHz, USB, LCP	39.47%	10.43%	10.42%	39.28%	0.40%

Da N22C1

Cm	- -	- +	+ -	+ +	invalid
4888.00MHz, USB, RCP	1.55%	48.08%	48.20%	1.55%	0.62%
4888.00MHz, USB, LCP	0.91%	48.67%	48.90%	0.90%	0.62%
4952.00MHz, LSB, RCP	1.55%	48.08%	48.20%	1.55%	0.62%
4952.00MHz, LSB, LCP	0.91%	48.67%	48.90%	0.90%	0.62%

Cm N22C3

Cm	- -	- +	+ -	+ +	invalid
4888.00MHz, USB, RCP	9.06%	40.57%	40.50%	8.98%	0.89%
4888.00MHz, USB, LCP	9.15%	40.42%	40.44%	9.11%	0.89%
4952.00MHz, LSB, RCP	9.06%	40.57%	40.50%	8.98%	0.89%
4952.00MHz, LSB, LCP	9.15%	40.42%	40.44%	9.11%	0.89%

Cm N22C2

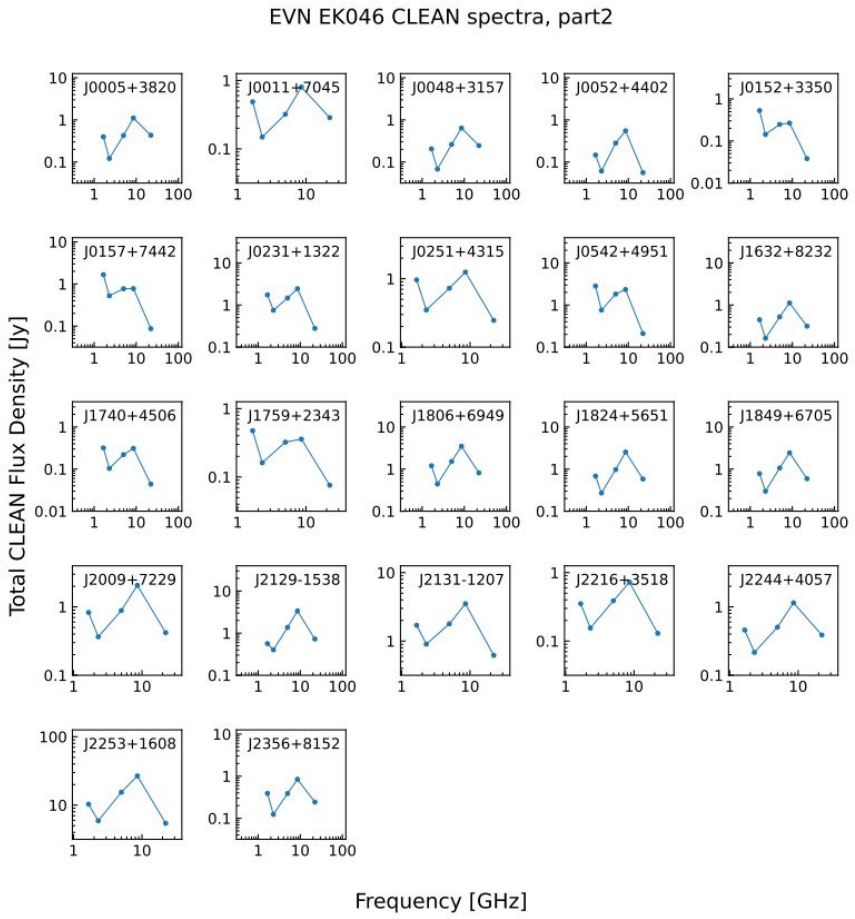
Pi	- -	- +	+ -	+ +	invalid
22280.00MHz, LSB, RCP	0.04%	49.42%	49.53%	0.04%	0.97%
22280.00MHz, LSB, LCP	0.00%	49.47%	49.56%	0.00%	0.96%
22280.00MHz, USB, RCP	0.04%	49.42%	49.53%	0.04%	0.97%
22280.00MHz, USB, LCP	0.00%	49.47%	49.56%	0.00%	0.96%

Pi N22K1

Kn	- -	- +	+ -	+ +	invalid
1626.49MHz, USB, RCP	2.91%	46.47%	46.97%	2.79%	0.87%
1626.49MHz, USB, LCP	6.22%	43.27%	43.67%	5.96%	0.87%
1690.49MHz, LSB, RCP	2.91%	46.47%	46.97%	2.79%	0.87%
1690.49MHz, LSB, LCP	6.22%	43.27%	43.67%	5.96%	0.87%

Kn N22L1

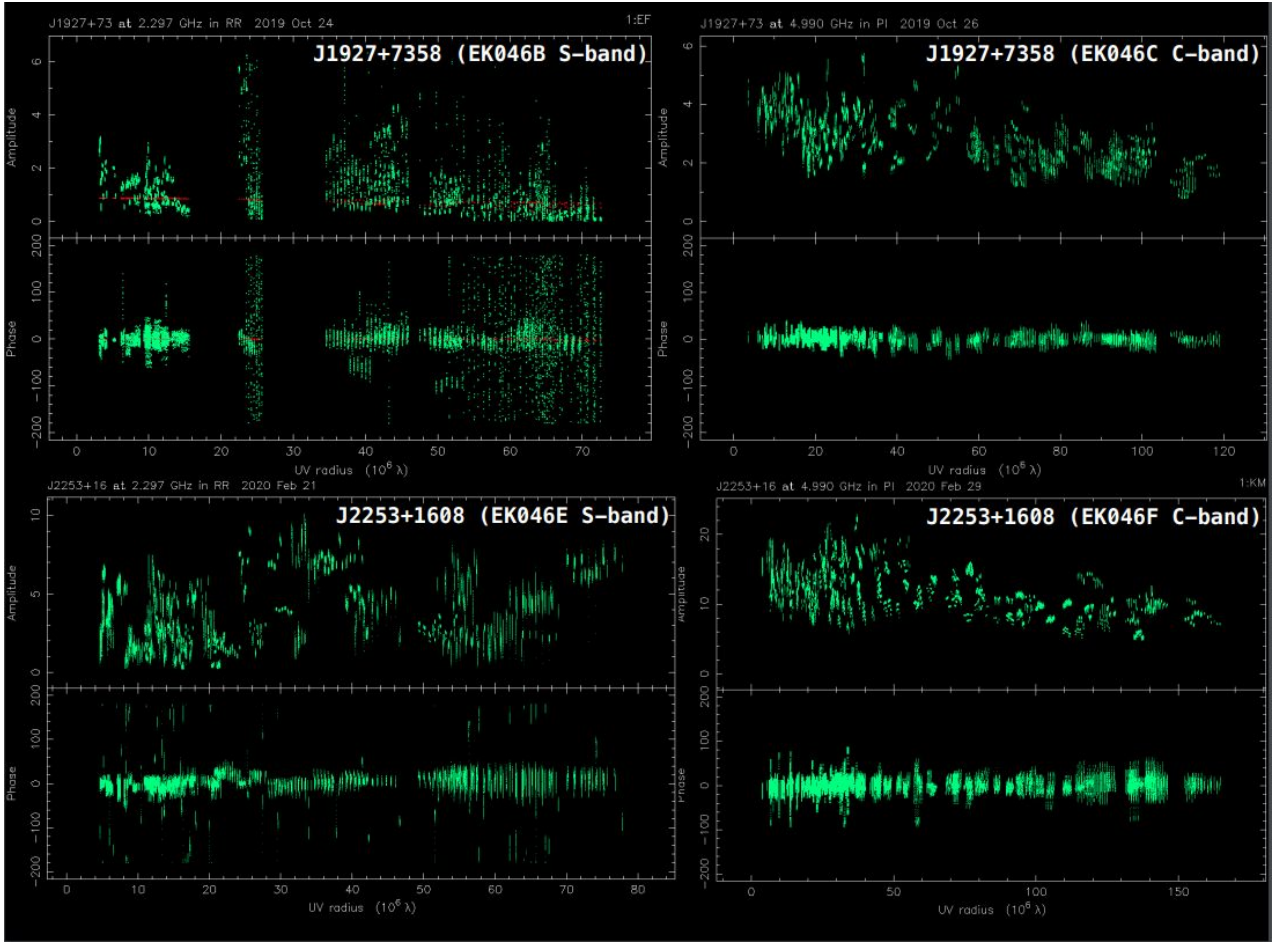
Issues : S/X band



- EK046A ~ H (2019 s3 ~ 2020 s1)
- S-band fluxes are systematically lower than X-band
- Tsys values are similar in both bands

JIVE
Joint Institute for VLBI ERIC

Issues : S/X band



JIVE
Joint Institute for VLBI ERIC

Improvements / fixed issues

- Highest dara record (4 Gbps) / Highest number of experiments
- Finally getting data from Ur (COVID restrictions released)
- Antab now has no negative values
- TY GC tables are attached to the data since 2022 session 1
- Q band phase referencing experiment → no serious issues on source position at Q band
- Most of the antenna continuous recording tsys → more reliable gains

Kind requests from the support scientists

- ❏ Please leave station feedback
- ❏ Please upload antab/log files to vlbeer (and check the files beforehand or leave notes)
- ❏ Communication : Join mattermost chat during NMEs and e-EVN runs
- ❏ Please respond to our emails
- ❏ Update your local scripts (e.g. antabfs.py)