Quality assessment of LOFAR data

Aleksandar Shulevski

LDS26, September 17, 2026

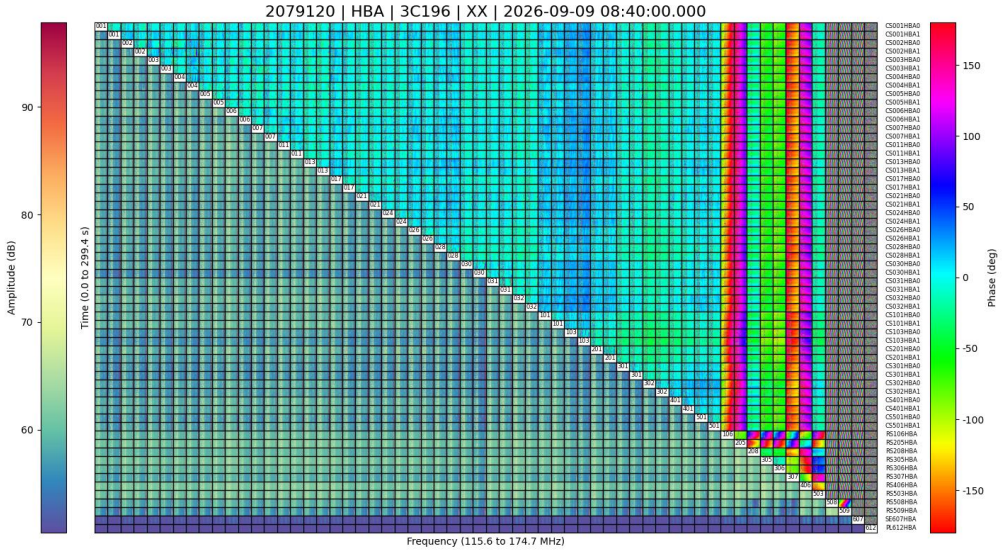


ASTRON
Netherlands Institute for Radio Astronomy

Quality assessment

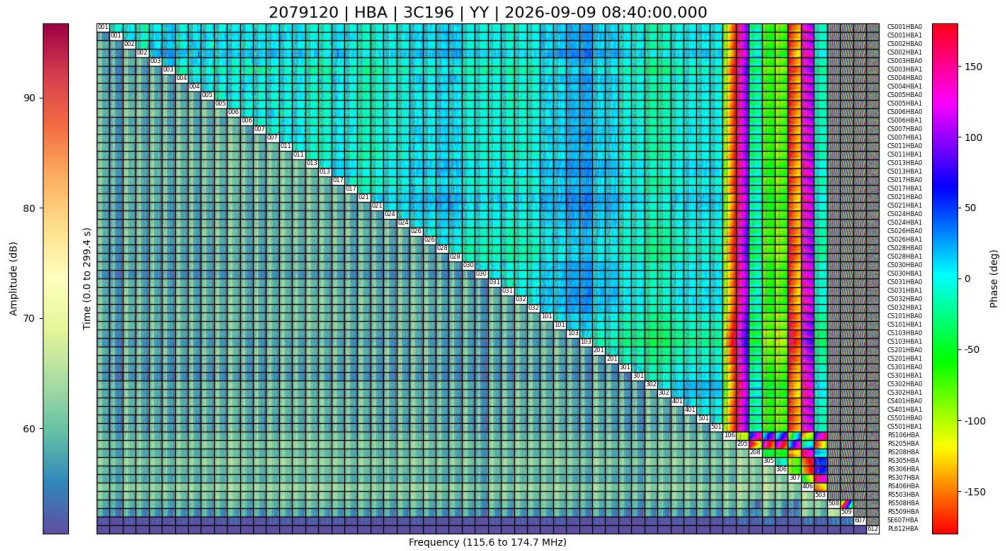
- Data quality metrics are needed for:
- Informing the PI / user of whether the observing run concluded successfully.
- Information automatic data reduction pipelines performed as expected
- Whether (science ready) data are of sufficient quality
- etc.

Raw visibilities (IF)

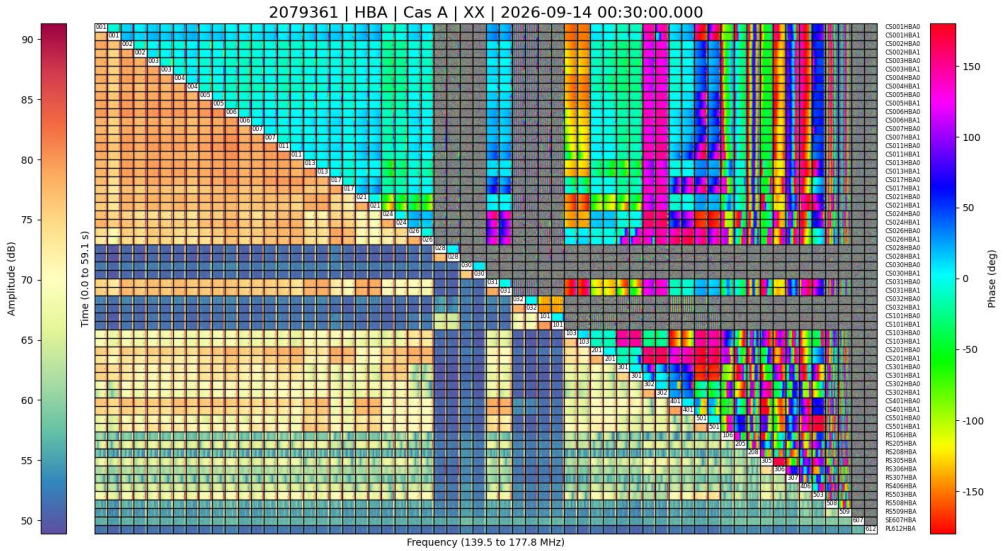


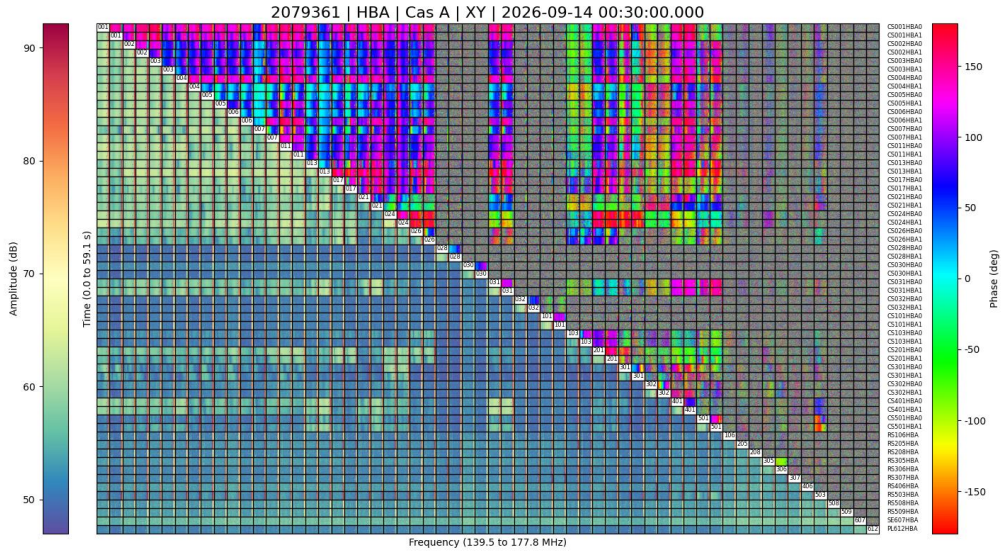


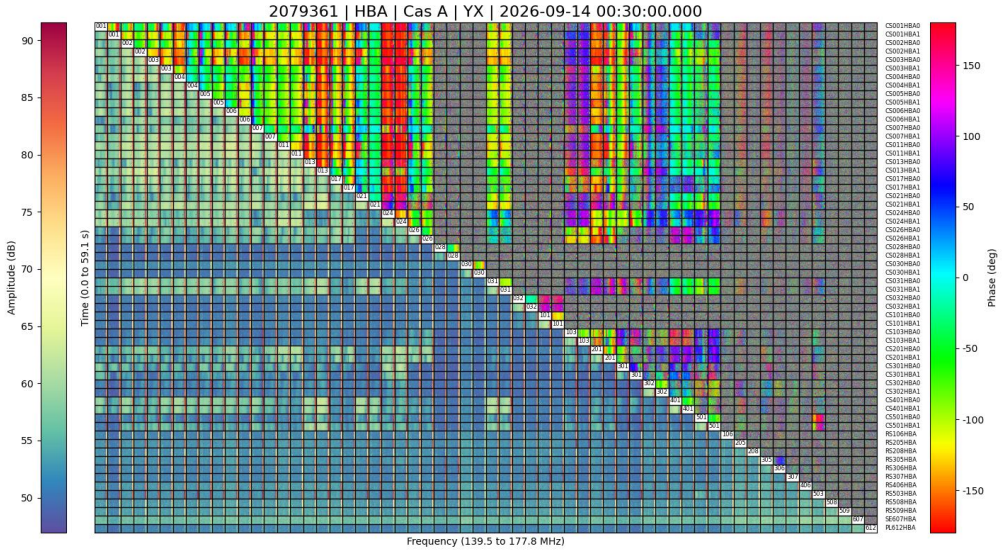


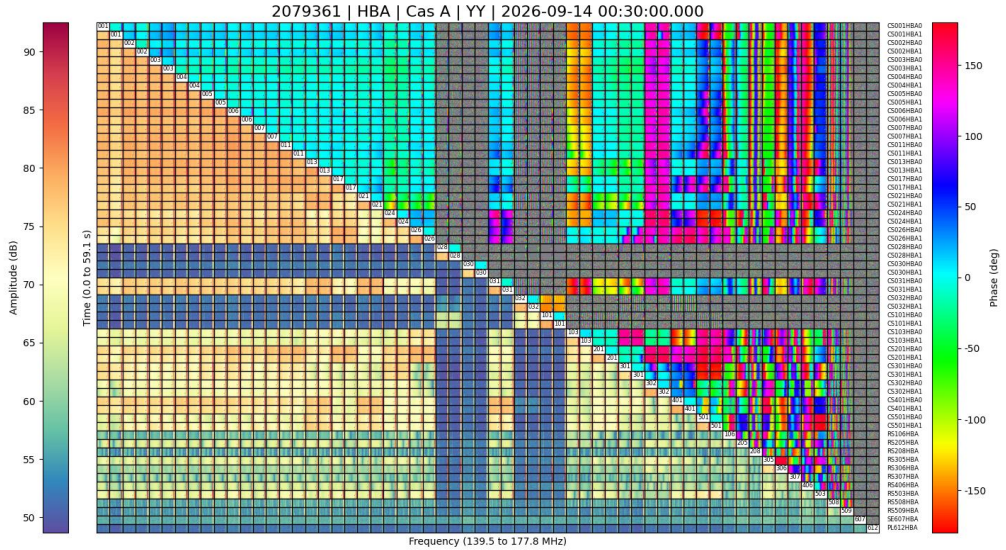


Raw visibilities (IF)

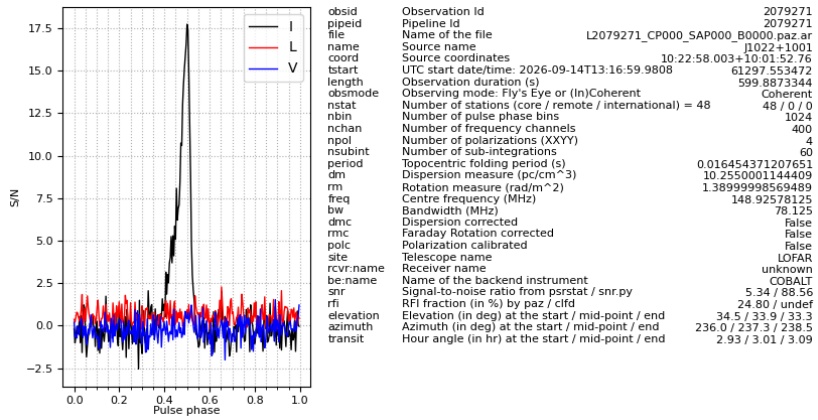




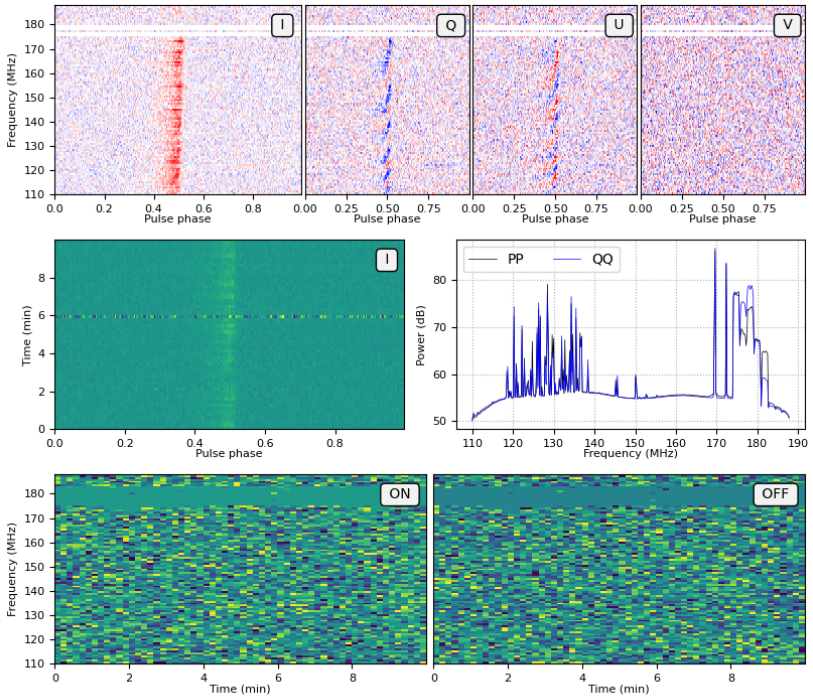


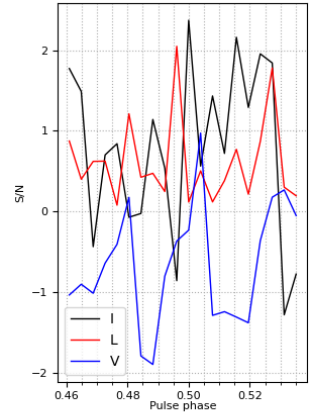


Time domain (BF)

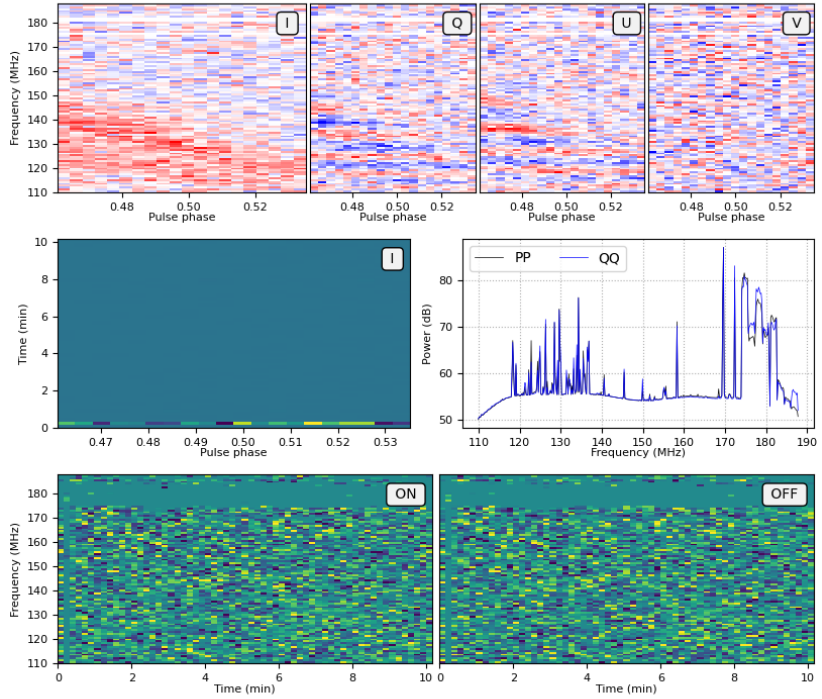


obsid	Observation Id	2079271
pipeid	Pipeline Id	2079271
file	Name of the file	L2079271_CP000_SAP000_B0000.paz.ar
name	Source name	J1022+1001
coord	Source coordinates	10:22:58.003+10:01:52.76
tstart	UTC start date/time: 2026-09-14T13:16:59.9808	61297.553472
length	Observation duration (s)	599.8873344
obsmode	Observing mode: Fly's Eye or (In)Coherent	Coherent
nstat	Number of stations (core / remote / international) = 48	48 / 0 / 0
nbin	Number of pulse phase bins	1024
nchan	Number of frequency channels	400
npol	Number of polarizations (XXYY)	4
nsubint	Number of sub-integrations	60
period	Topocentric folding period (s)	0.016454371207651
dm	Dispersion measure (pc/cm^3)	10.2550001144409
rm	Rotation measure (rad/m^2)	1.38999998569489
freq	Centre frequency (MHz)	148.92578125
bw	Bandwidth (MHz)	78.125
dmc	Dispersion corrected	False
rmc	Faraday Rotation corrected	False
polc	Polarization calibrated	False
site	Telescope name	LOFAR
rcvr:name	Receiver name	unknown
be:name	Name of the backend instrument	COBALT
snr	Signal-to-noise ratio from psrstat / snr.py	5.34 / 88.56
rfi	RFI fraction (in %) by paz / clfd	24.80 / undef
elevation	Elevation (in deg) at the start / mid-point / end	34.5 / 33.9 / 33.3
azimuth	Azimuth (in deg) at the start / mid-point / end	236.0 / 237.3 / 238.5
transit	Hour angle (in hr) at the start / mid-point / end	2.93 / 3.01 / 3.09

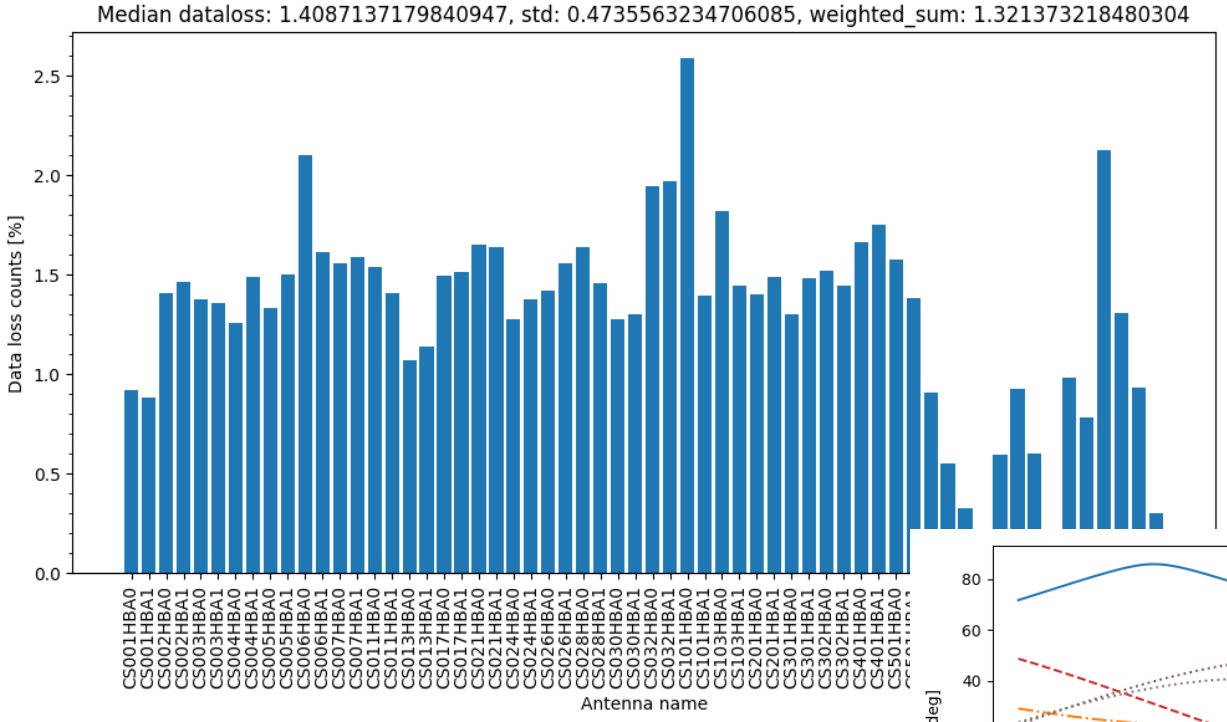


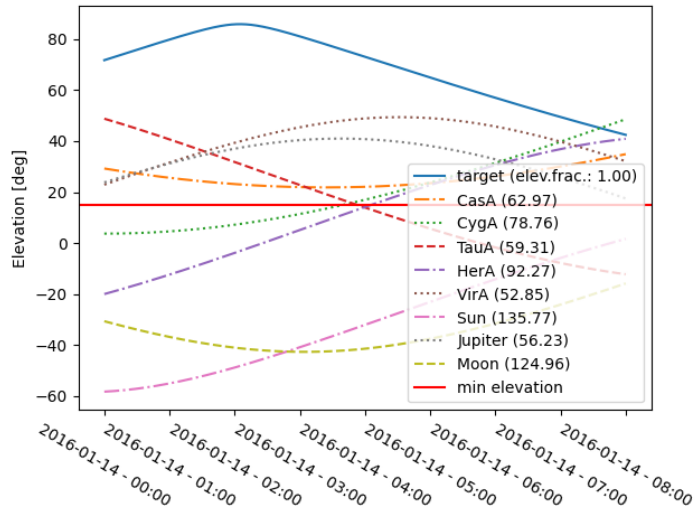


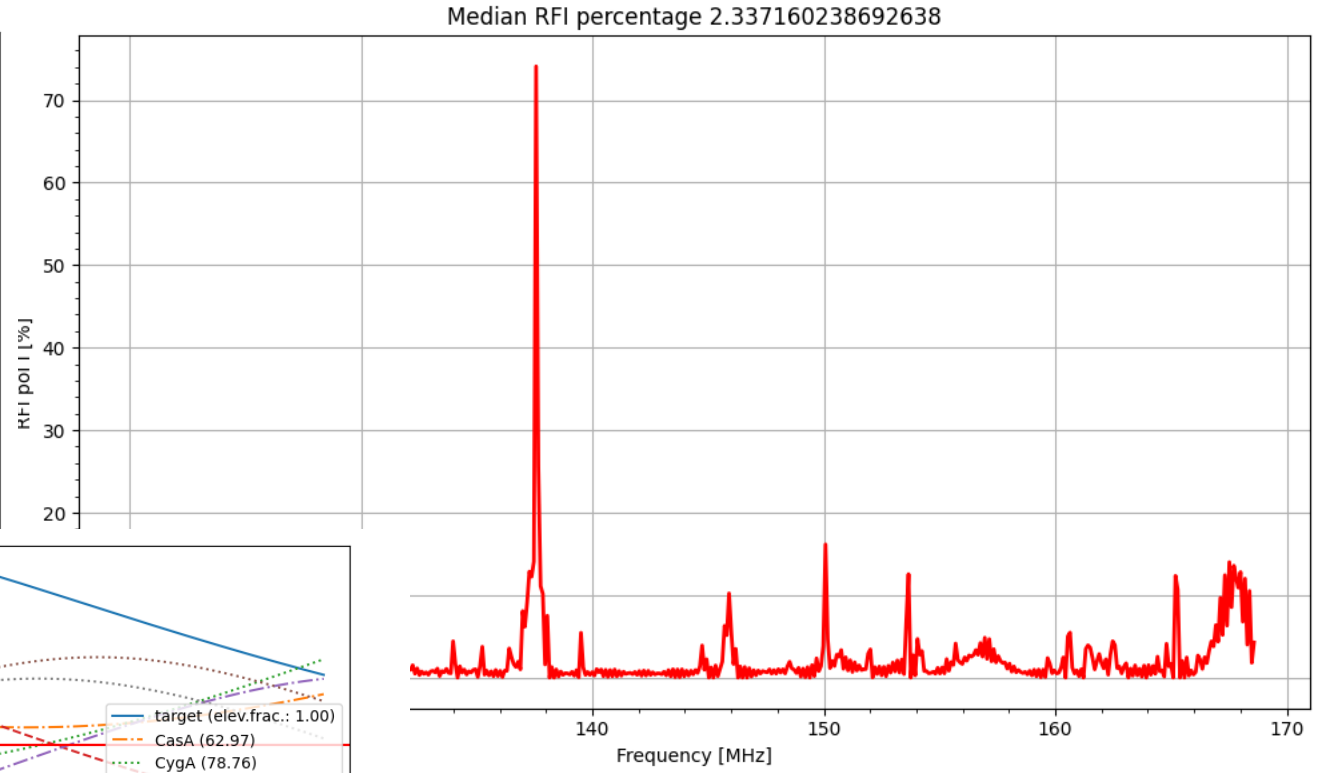
obsid	Observation Id	2079256
pipeid	Pipeline Id	2079256
file	Name of the file	L2079256_CP000_SAP000_B0000.paz.ar
name	Source name	J1012+5307
coord	Source coordinates	10:12:33.434+53:07:02.59
tstart	UTC start date/time: 2026-09-14T07:05:59.9712	61297.295833
length	Observation duration (s)	609.78461696
obsmode	Observing mode: Fly's Eye or (In)Coherent	Coherent
nstat	Number of stations (core / remote / international) = 48	48 / 0 / 0
nbin	Number of pulse phase bins	1024
nchan	Number of frequency channels	400
npol	Number of polarizations (XXYY)	4
nsubint	Number of sub-integrations	61
period	Topocentric folding period (s)	0.00525513388148625
dm	Dispersion measure (pc/cm^3)	9.0211296081543
rm	Rotation measure (rad/m^2)	2.59999990463257
freq	Centre frequency (MHz)	148.92578125
bw	Bandwidth (MHz)	78.125
dmc	Dispersion corrected	False
rmc	Faraday Rotation corrected	False
polc	Polarization calibrated	False
site	Telescope name	LOFAR
rcvr:name	Receiver name	unknown
be:name	Name of the backend instrument	COBALT
snr	Signal-to-noise ratio from psrstat / snr.py	4.39 / 2.48
rfi	RFI fraction (in %) by paz / clfd	32.70 / undef
elevation	Elevation (in deg) at the start / mid-point / end	62.5 / 63.3 / 64.0
azimuth	Azimuth (in deg) at the start / mid-point / end	70.7 / 71.2 / 71.7
transit	Hour angle (in hr) at the start / mid-point / end	-3.10 / -3.01 / -2.93



Pipelines – data compression – automatic Q flag assignment







Quality assessment

Q/A as a result of theLDV project:

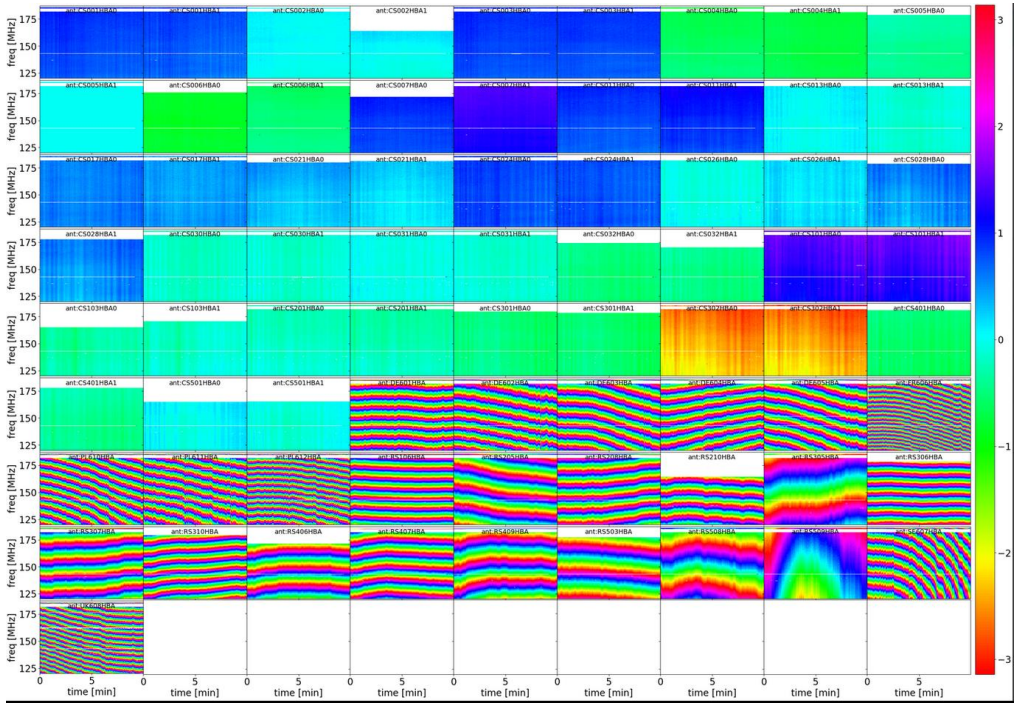
Averaging Pipeline 1 to 100 (showing 100 of total 272)

edit columns

first previous 1 2 3 next last

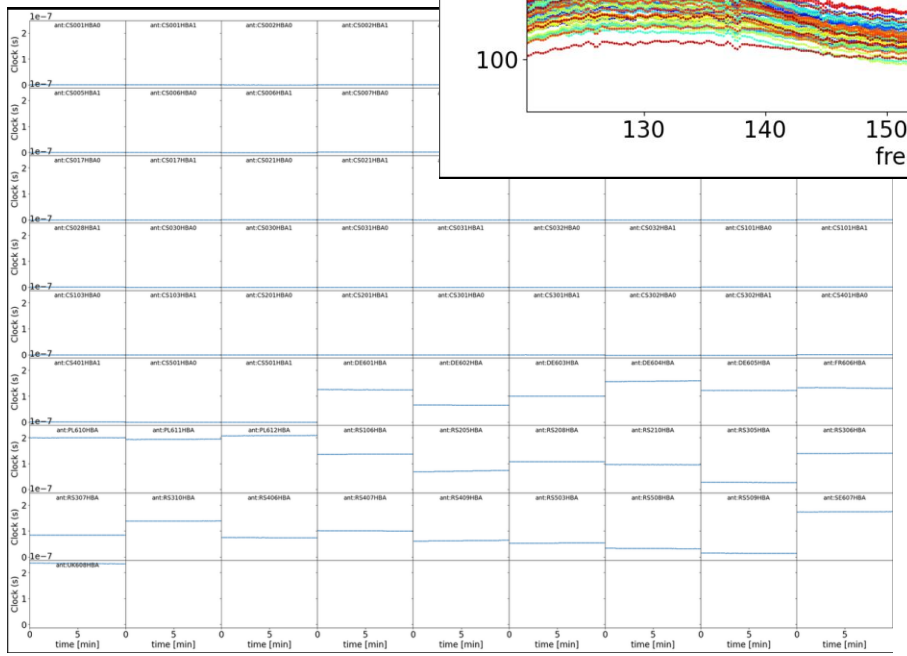
#	Project	Release Date	Pipeline Name	Pipeline Version	SAS Id	Measurement Type	Frequency Integration Step	Time Integration Step	Strategy Name	Flag Auto Correlations	Demixing	Number Of Correlated DataProducts	Source DataProduct	All Dataproducts	Quality	Ancillary
1	LT5_007		P036+31/1.1/ TPCOMP	v0.3.0	202600000634	Calibration	1	1	Compression pipeline	1	0	77 / 232	show	show	Moderate	show ancillary
2	LT5_007		3C295/1.0/ TPCOMP	v0.3.0	202600000633	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
3	LT5_007		P222+60/1.2/ TPCOMP	v0.3.0	202600000631	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
4	LT5_007		P233+60/1.1/ TPCOMP	v0.3.0	202600000630	Calibration	1	1	Compression pipeline	1	0	231 / 232	show	show	Moderate	show ancillary
5	LT5_007		3C196/1.0/ TPCOMP	v0.3.0	202600000629	Calibration	1	1	Compression pipeline	1	0	232	show	show	Poor	show ancillary
6	LT5_007		P189+57/1.2/ TPCOMP	v0.3.0	202600000628	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
7	LT5_007		P176+60/1.1/ TPCOMP	v0.3.0	202600000627	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
8	LT5_007		3C295/1.0/ TPCOMP	v0.3.0	202600000626	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
9	LT5_007		3C295/1.0/ TPCOMP	v0.3.0	202600000625	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
10	LT5_007		P236+55/1.2/ TPCOMP	v0.3.0	202600000624	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
11	LT5_007		P239+50/1.1/ TPCOMP	v0.3.0	202600000623	Calibration	1	1	Compression pipeline	1	0	232	show	show	Moderate	show ancillary
12	LT5_007		3C196/1.0/ TPCOMP	v0.3.0	202600000622	Calibration	1	1	Compression pipeline	1	0	232	show	show	Poor	show ancillary

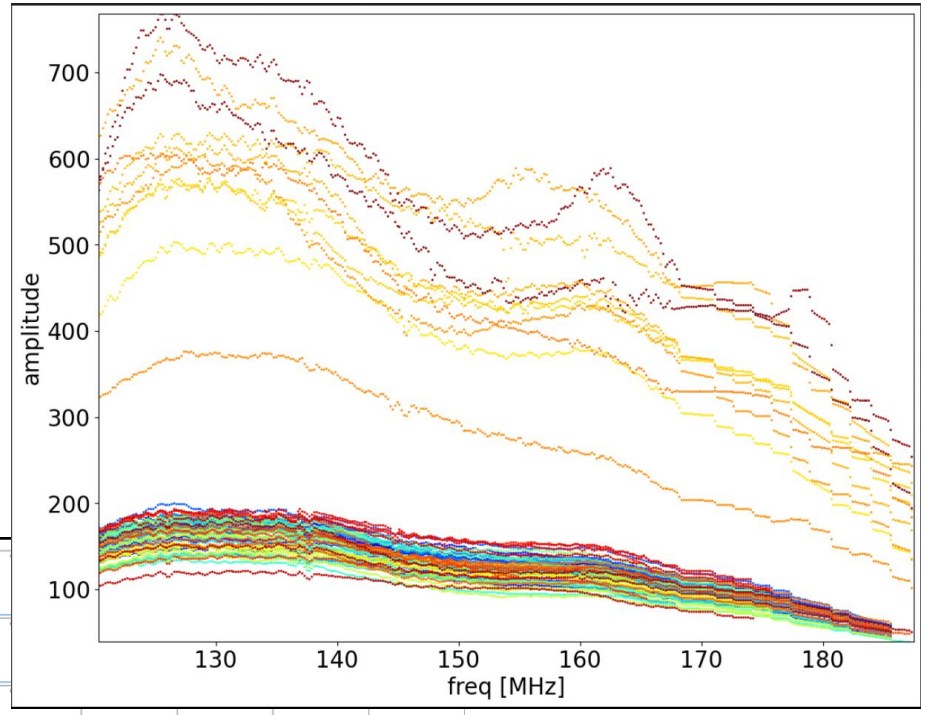
Pipelines – LINC (calibrator)



phase

clock





bandpass

Pipelines – LINC (target)

TEC

Elevation

phase (time/freq)

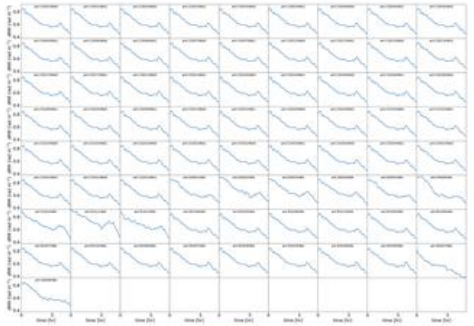
Phase (time)

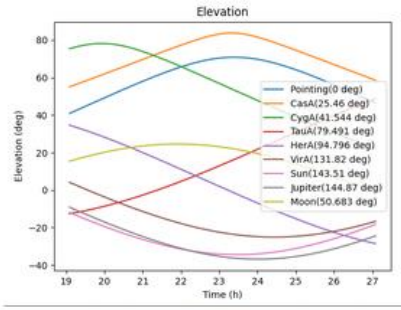
Polarization difference

Flagged fraction

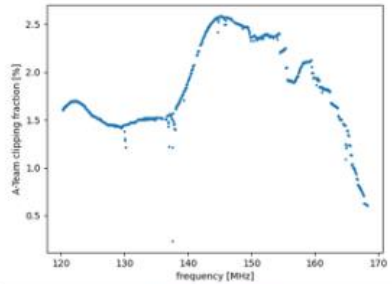
UV coverage

LINC target image

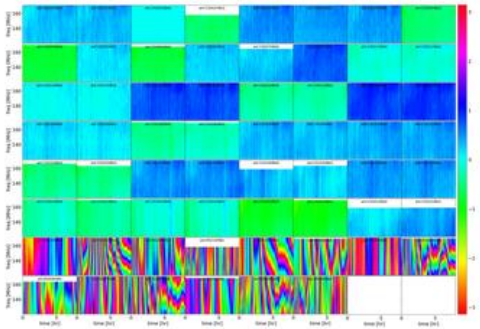

Spinifex

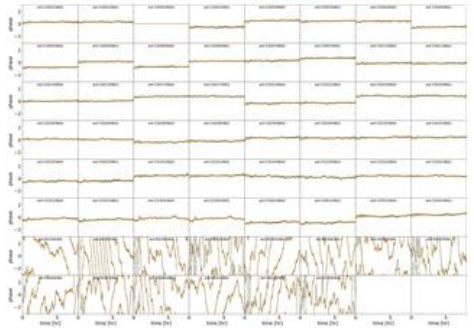


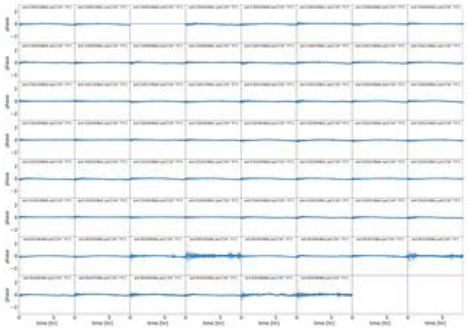
A-team

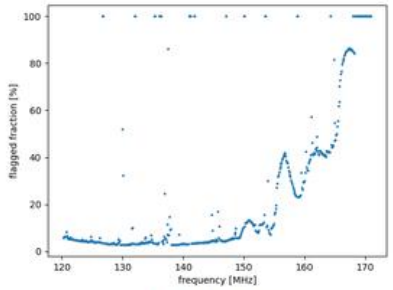


data clip fraction

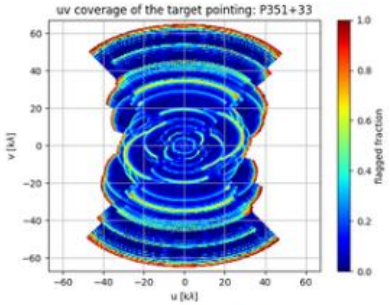

ph_pol_XX


ph_freq_143_69

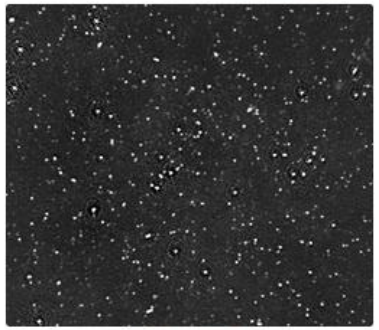

ph_poldiff_151_5



flagged_fraction

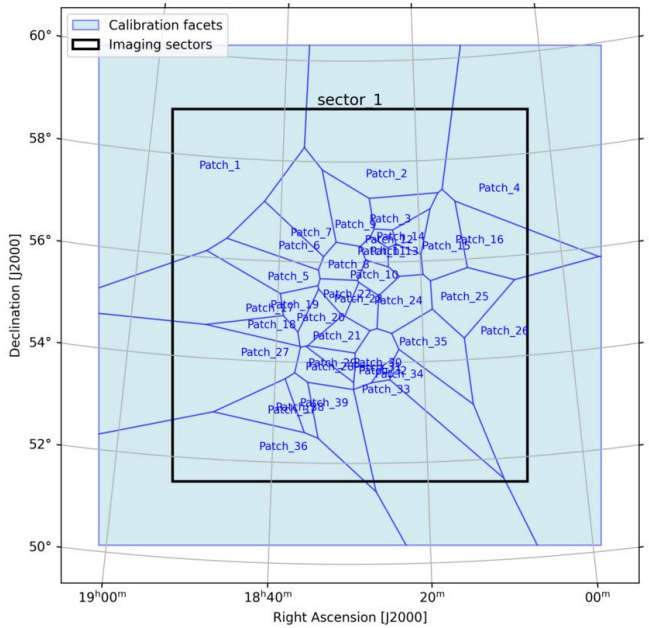


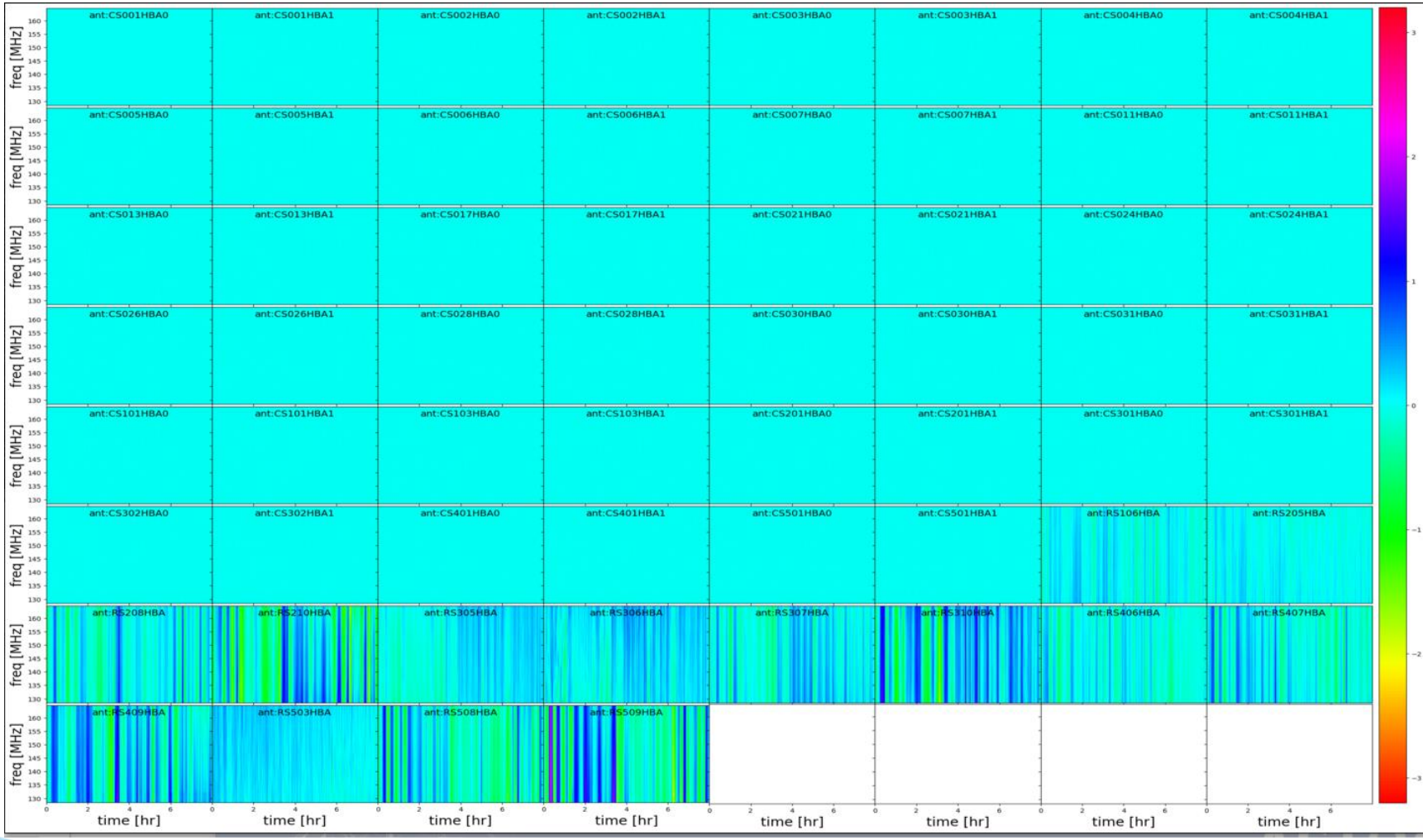
uv_coverage


LINC_image

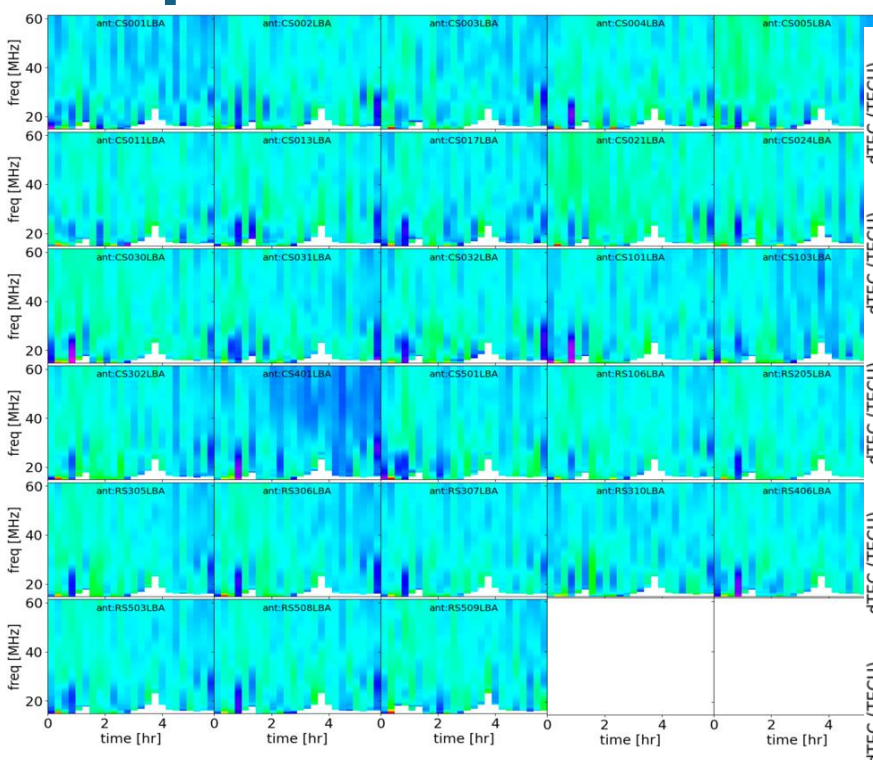
Pipelines – RAPTHOR

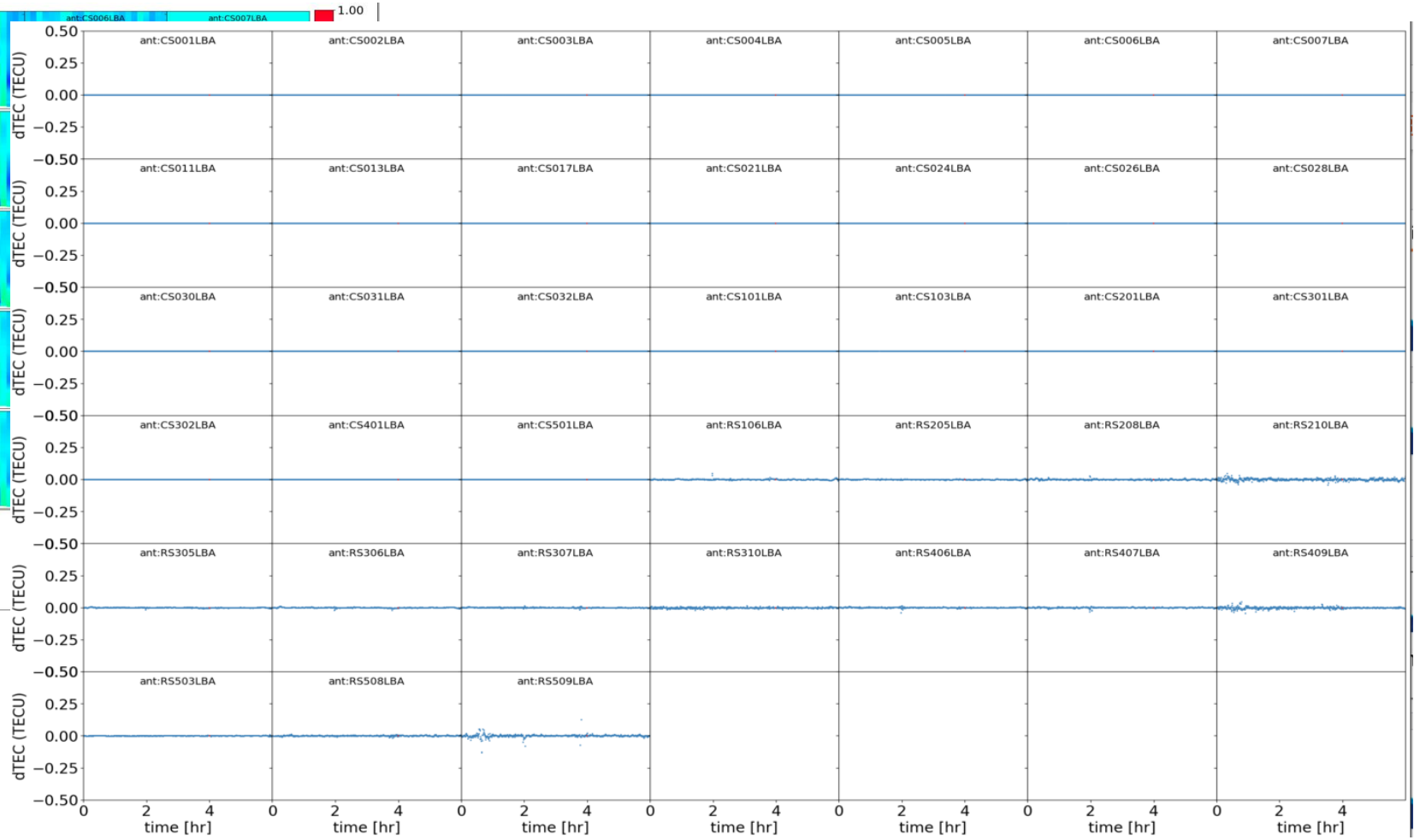
Fast phase facet





Pipelines – LiLF





Pipelines – PILOT, Solar

. . .



O&A

