MK flagging of the Deep2 field observations

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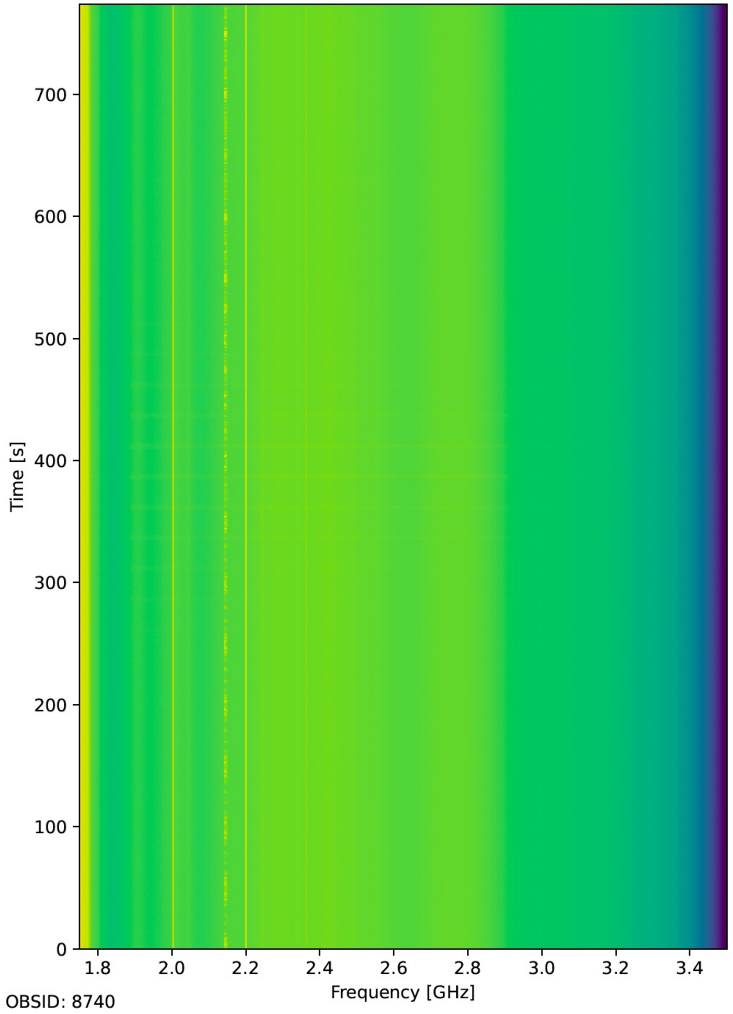
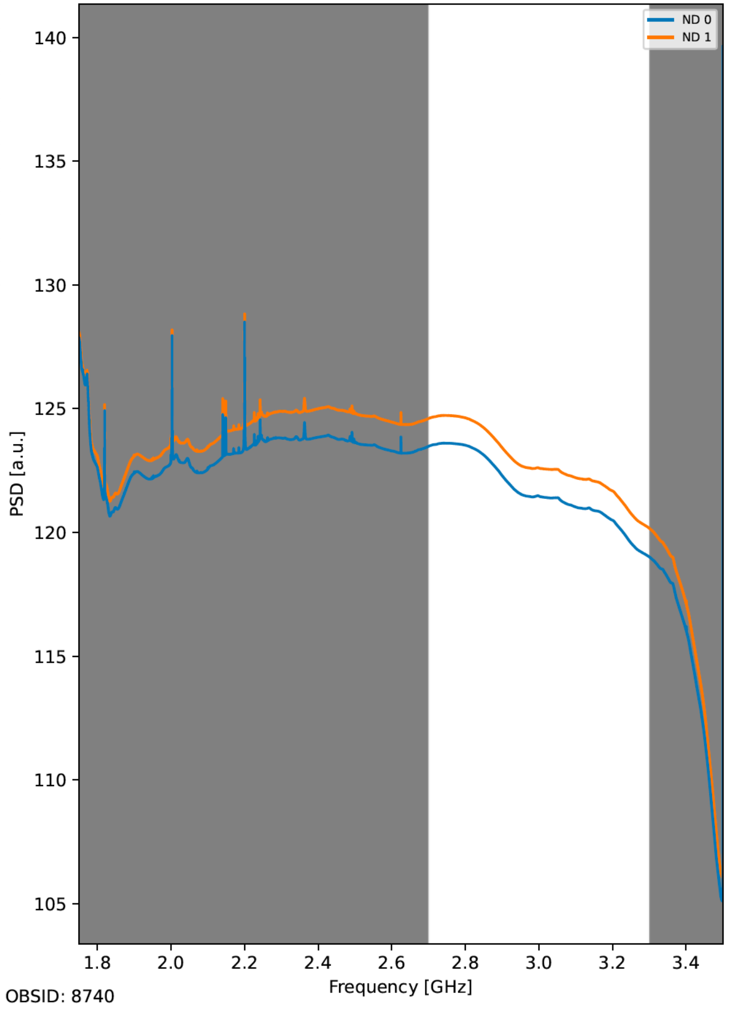
MK Deep2 observation full flagging

RFI mitigation – there is NO general cure for that !!!

full S-Band SKAMPI observations

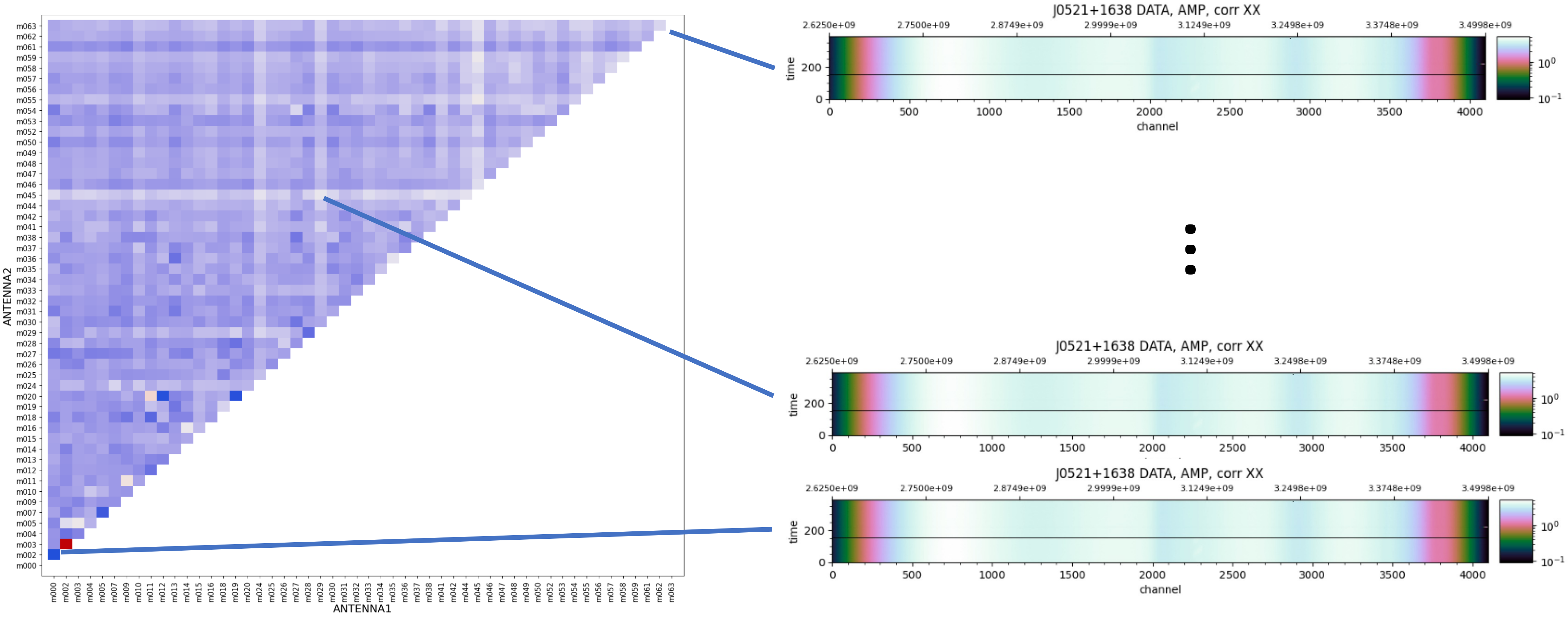




MK Deep2 observation full flagging

RFI mitigation – there is NO general cure for that !!!

one could produce for each baseline a waterfall spectrum



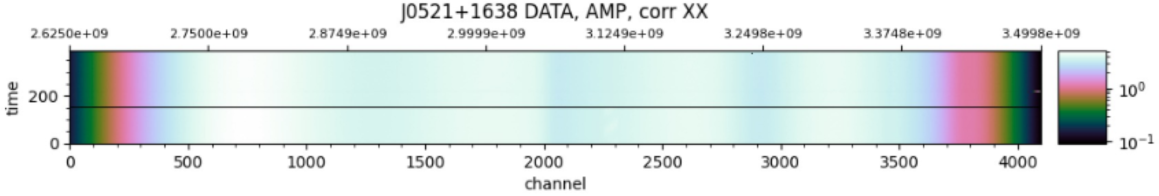
MK Deep2 observation full flagging

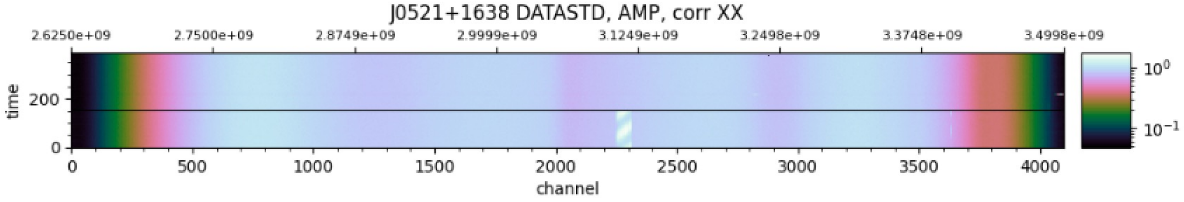
RFI mitigation – there is NO general cure for that !!!

- most of the RFI seen in an interferometer is baseline dependent
- developed a novel approach to investigate waterfall spectra

Averaging of the data

- following MS structure
- complex number spectrum per int time per baseline
- determine the average of all availible baselines (mean) and the standart derivation (std)





Convolutional filtering

- e.g. 'robx','roby','scharrx','scharry','sobelx’, …. See inside the code
- Cleaning up mask e.g. flagging channels that are already masked by x% of the time, etc.

MK Deep2 observation full calibration

RFI mitigation – there is NO general cure and needs to be applied at various steps in the calibration of radio initerferometric observations (like Dante’s 9 steps to hell)

- facilitated Sarrvesh comissioning calibration scripts into a full workflow

- Generation of calibration
  - 1GC
  - 2GC

within the workflow there are various data products for which you need a specialised flagging approach

```
00_OBS_INFORMATION
01_BAD_SCANS_SPLITT.py
02_OBS_INFORMATION
03_preflag_1678454471.py
04_DO_SPECFLAG
04_DO_SPECFLAG_OUTPUT/
05_DO_SPECFLAG
05_DO_SPECFLAG_OUTPUT/
06_GENERATE_SPEC_FLAG
06_GENERATE_SPEC_FLAG_OUTPUT/
07_APPLY_SPEC_FLAG
08_PRECAL_FORBETTERFG.py
09_MAKE_MULTIPLE_SPWD_FILE.py
10_OBS_INFORMATION
11_DO_FULL_CALIBRATION.py
12_SPLIT_PHASE_AND_TARGET.py
13_1_0_DO_WF_FLAGING
13_1_0_DO_WF_FLAGING_OUTPUT/
13_1_1_DO_WF_FLAGING
13_1_1_DO_WF_FLAGING_OUTPUT/
13_1_2_DO_WF_FLAGING
13_1_2_DO_WF_FLAGING_OUTPUT/
13_2_0_DO_WF_FLAGING
13_2_0_DO_WF_FLAGING_OUTPUT/
13_2_1_DO_WF_FLAGING
13_2_1_DO_WF_FLAGING_OUTPUT/
13_2_2_DO_WF_FLAGING
13_2_2_DO_WF_FLAGING_OUTPUT/
14_DIAGNOSTIC_PLOTS
14_DIAGNOSTIC_PLOTS_OUTPUT/
15_1_SELF_CAL
15_1_SELF_CAL_J0252-7104_16SPWD/
15_2_SELF_CAL
15_2_SELF_CAL_J0413-8000/
16_1_CHECK_SELF_CAL
16_1_Primary_Beam_CORRECTIONS_J0252-7104_16SPWD/
16_2_Primary_Beam_CORRECTIONS_J0413-8000_16SPWD/
```

MK Deep2 observation full flagging

03_preflag_1678454471.py

on full dataset, no spwds, uncalibrated

```
# Flag autocorrelations
#
casatasks.flagdata(vis=ms_name, mode='manual', autocorr=True, flagbackup=False)

# Flag for shadowing
casatasks.flagdata(vis=ms_name, mode='shadow', flagbackup=False)

# Flag edge channels
casatasks.flagdata(vis=ms_name, spw='0:0', flagbackup=False, mode='manual')

# Clip for zeros
casatasks.flagdata(vis=ms_name, flagbackup=False, mode='clip', clipzeros=True)

# Flag based on upper limit
casatasks.flagdata(vis=ms_name, mode='clip', clipminmax=[0.0,UPDLIMT])
```

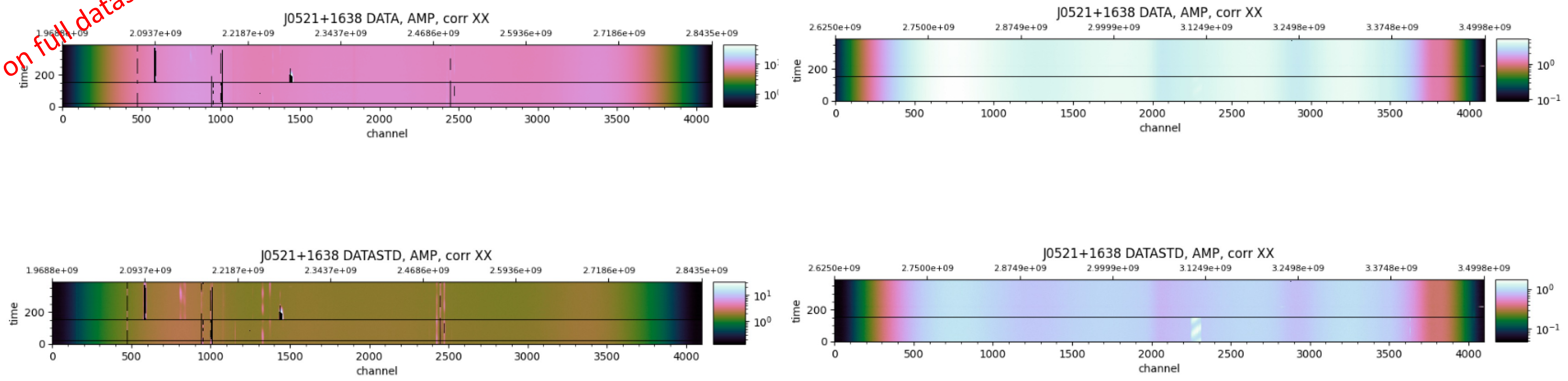
```
UPDLIMT = 100.0
```

MK Deep2 observation full flagging

two scans begin and end of the entire observation run

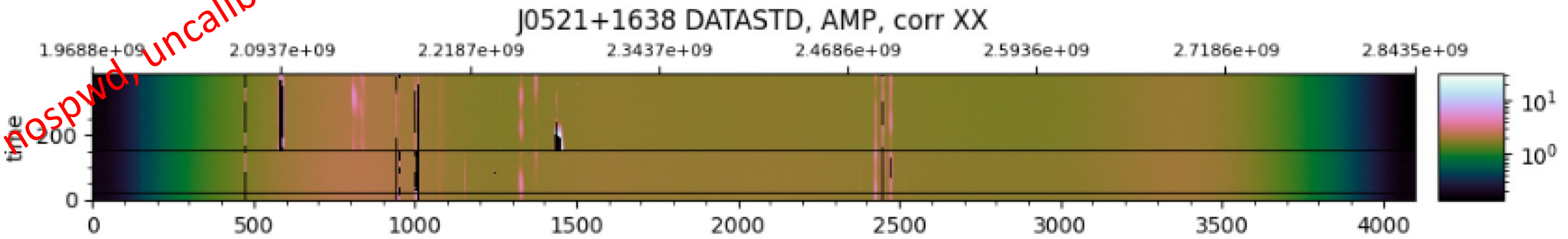
04_DO_SPECFLAG
05_DO_SPECFLAG
06_GENERATE_SPEC_FLAG
07_APPLY_SPEC_FLAG

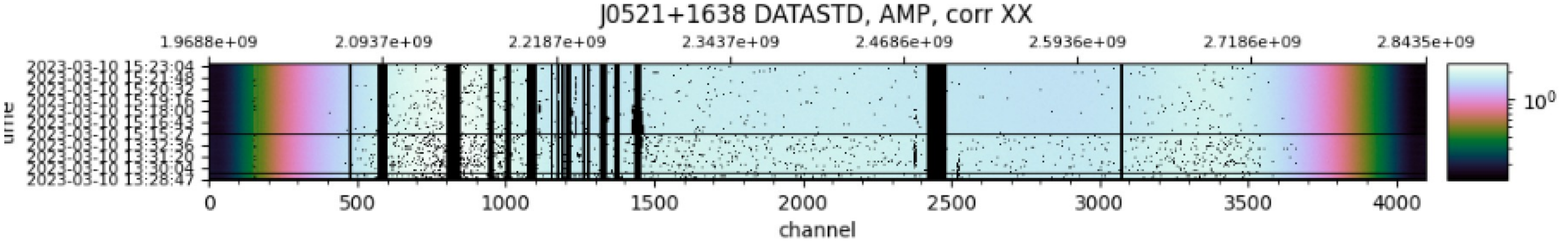
on full dataset, nospwd, uncalibrated

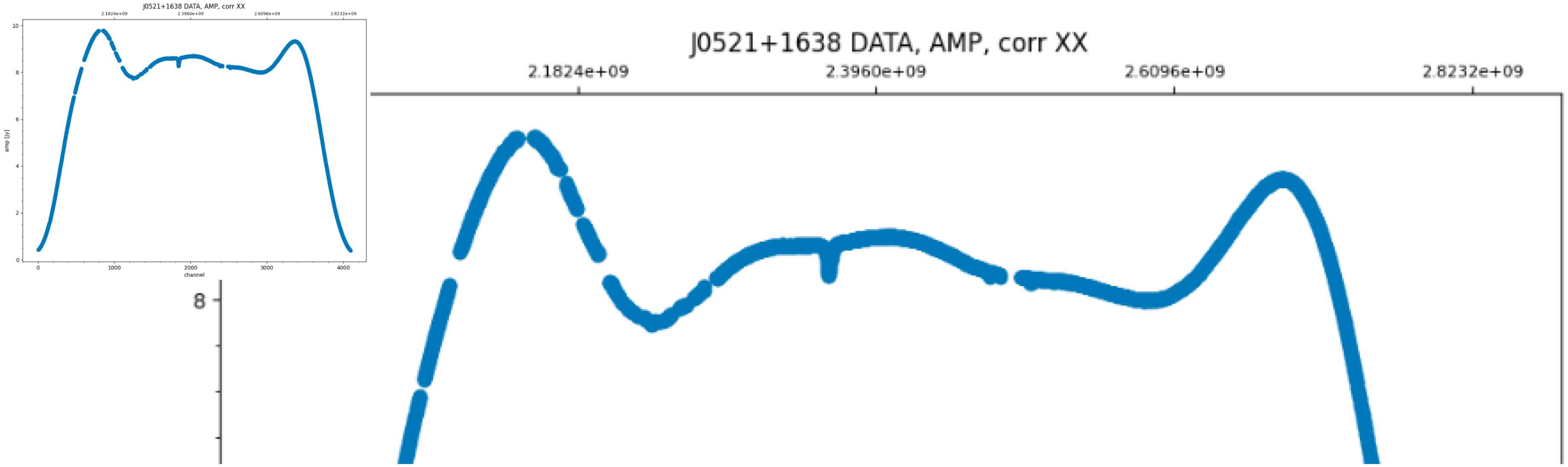


MK Deep2 observation full flagging

on full dataset, nospwd, uncalibrated







04_DO_SPECFLAG
05_DO_SPECFLAG
06_GENERATE_SPEC_FLAG
07_APPLY_SPEC_FLAG

WATERFALL SPEC THAT HAS BEEN MASKED

Based on the determine the channels that are flagged by %

FLAG channels in entire dataset

MK Deep2 observation full flagging

08_PRECAL_FORBETTERFG.py

does a calbration run to determine the passband shape
for better flagging of spectra features

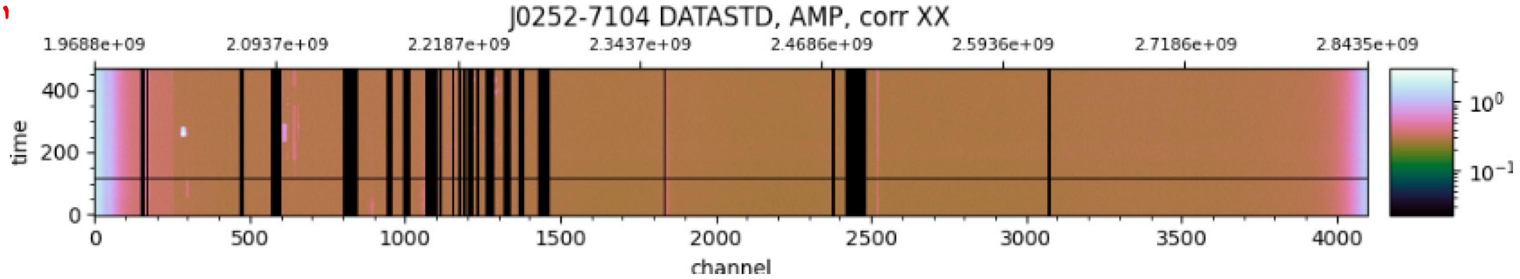
on full dataset, nospwd, calibrated

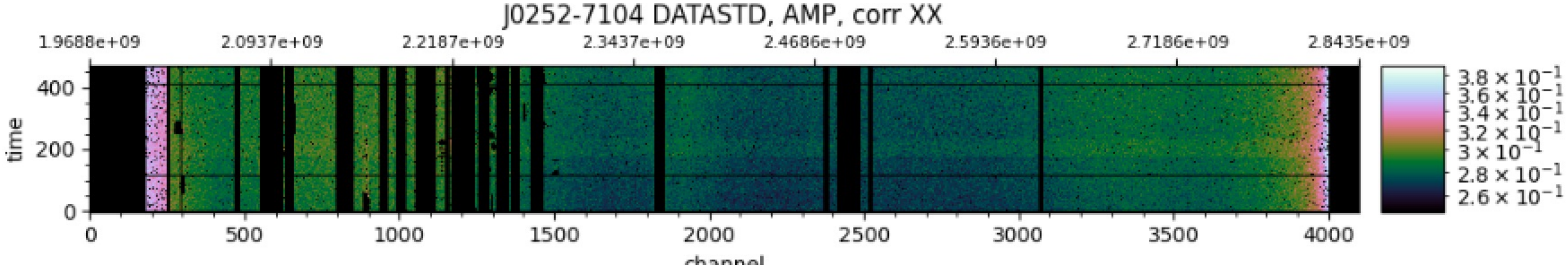
```
casatasks.flagdata(vis=ms_name,
        field=flux_cal,
        datacolumn='corrected',
        flagbackup=False,
        mode='rflag',
        timecutoff=5.0, freqcutoff=5.0,
        timefit="poly", freqfit="poly", flagdimension="freqtime",
        timedevscale=5., freqdevscale=5.,
        extendflags=False)
#
casatasks.flagdata(vis=ms_name, mode="extend", field=flux_cal,
        datacolumn="corrected", clipzeros=True, ntime="scan",
        extendflags=True, extendpols=True, flagbackup=False,
        growtime=90.0, growfreq=90.0, growaround=True, flagneartime=True, flag
nearfreq=True)
```

MK Deep2 observation full flagging

13_1_0_DO_WF_FLAGING
13_1_1_DO_WF_FLAGING_OUTPUT/
13_1_2_DO_WF_FLAGING

source dataset, 16 spwd, calibrated


J0252-7104 DATASTD, AMP, corr XX
1.9688e+09
2.0937e+09
2.2187e+09
2.3437e+09
2.4686e+09
2.5936e+09
2.7186e+09
2.8435e+09
time
channel
10^0
10^{-1}


J0252-7104 DATASTD, AMP, corr XX
1.9688e+09
2.0937e+09
2.2187e+09
2.3437e+09
2.4686e+09
2.5936e+09
2.7186e+09
2.8435e+09
time
channel
3.8×10^{-1}
3.6×10^{-1}
3.4×10^{-1}
3.2×10^{-1}
3×10^{-1}
2.8×10^{-1}
2.6×10^{-1}