

Francesco de Gasperin
 Bologna - 20.06.2017



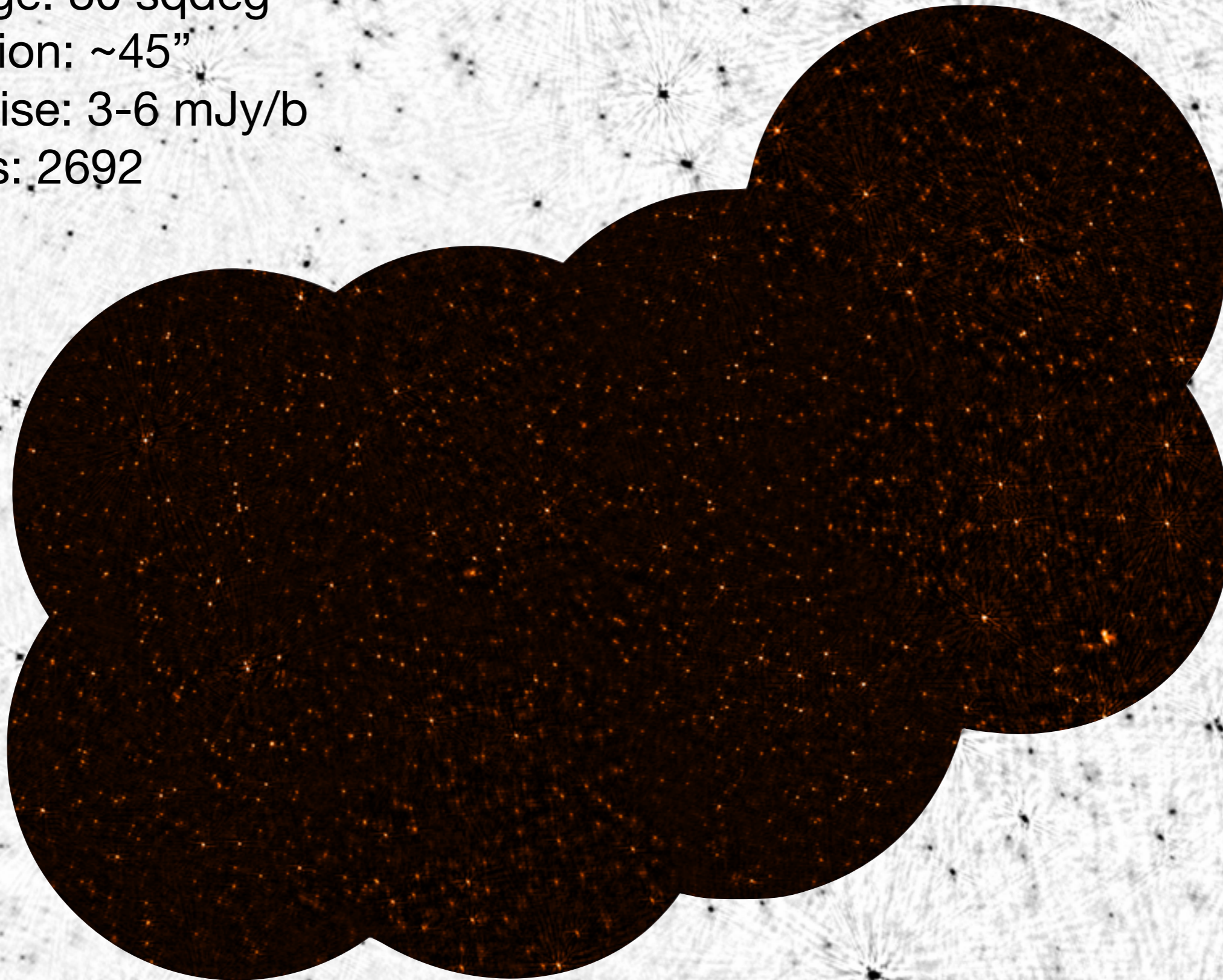
Pointings: 8

Coverage: 80 sqdeg

Resolution: $\sim 45''$

Rms noise: 3-6 mJy/b

Sources: 2692

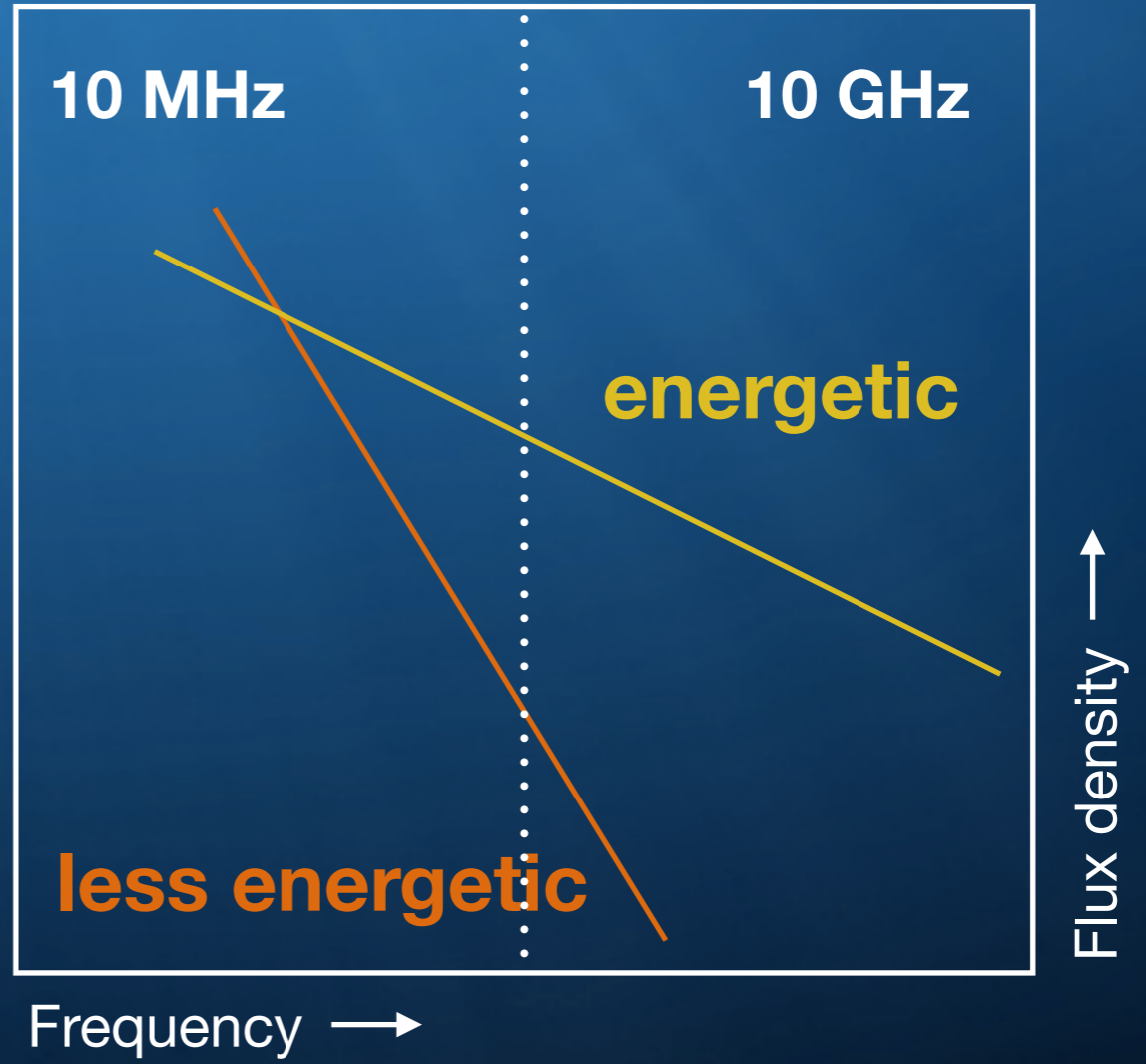


Critical frequency:

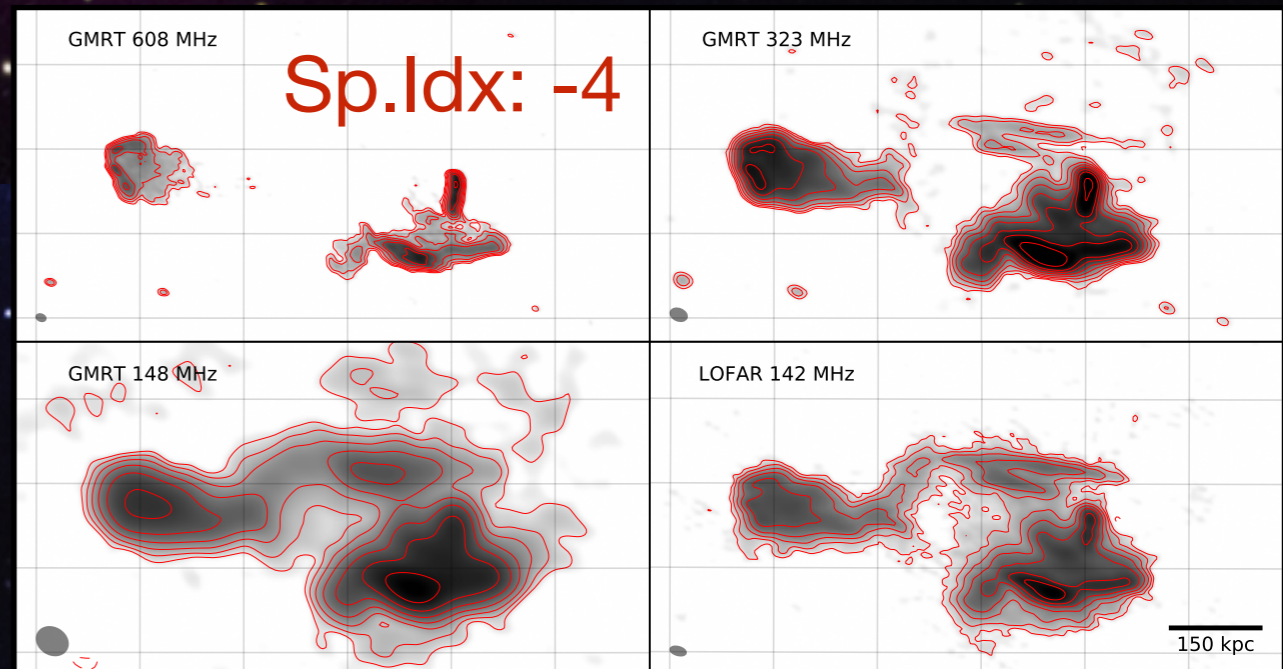
$$\nu_c = \frac{3\gamma^2 e B}{4\pi m_e}$$

Energy injected is related with spectral slope

USS radio halos
dead AGNs
GReETs
....

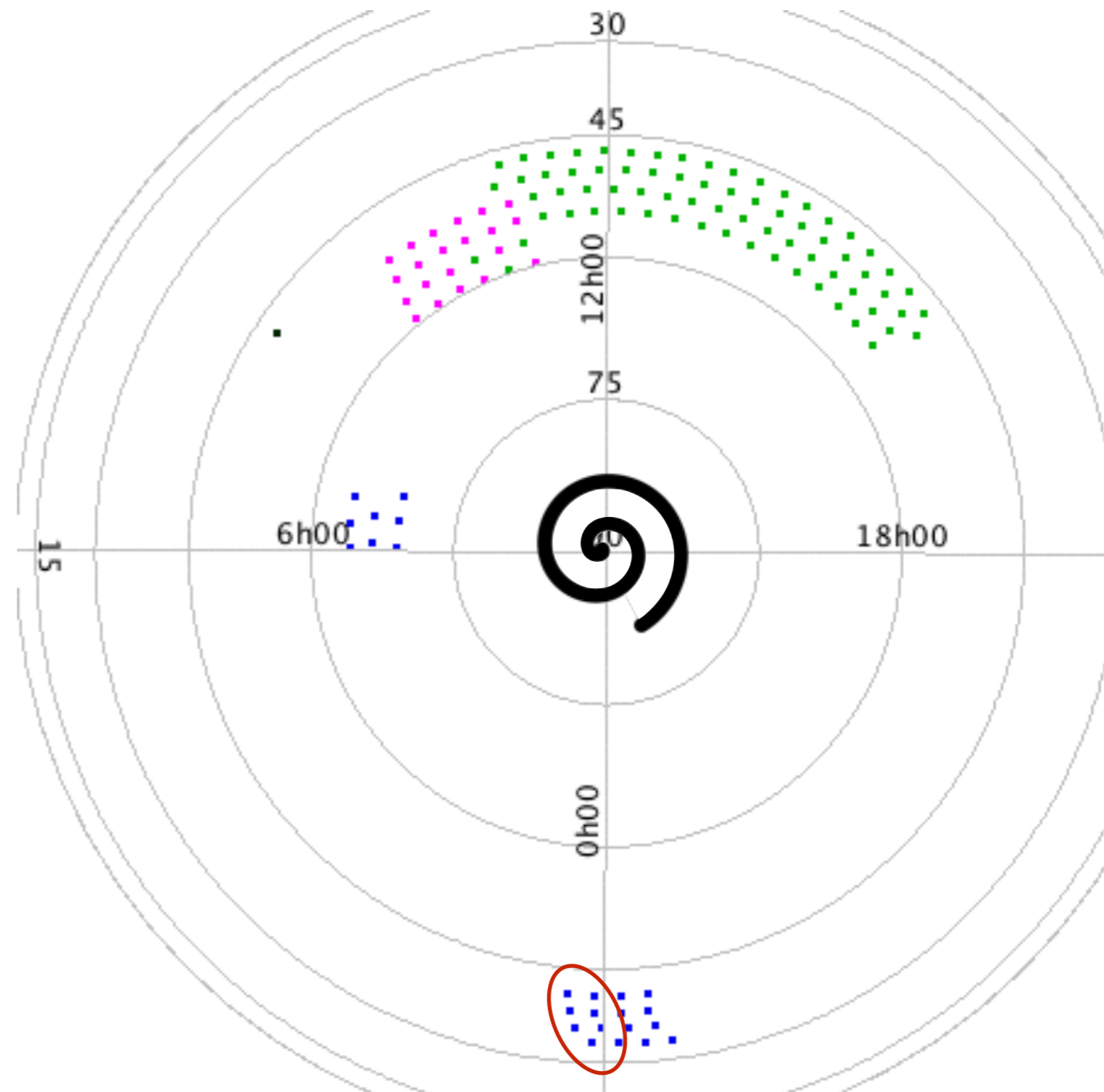
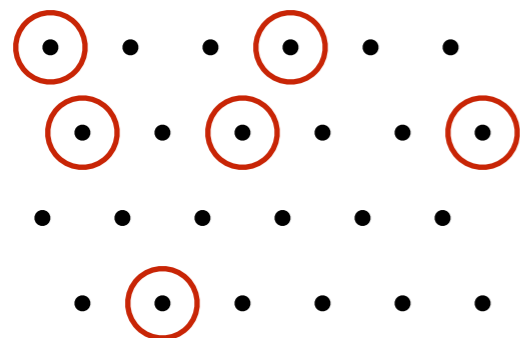


Gently re-energised tails



Observing Strategy

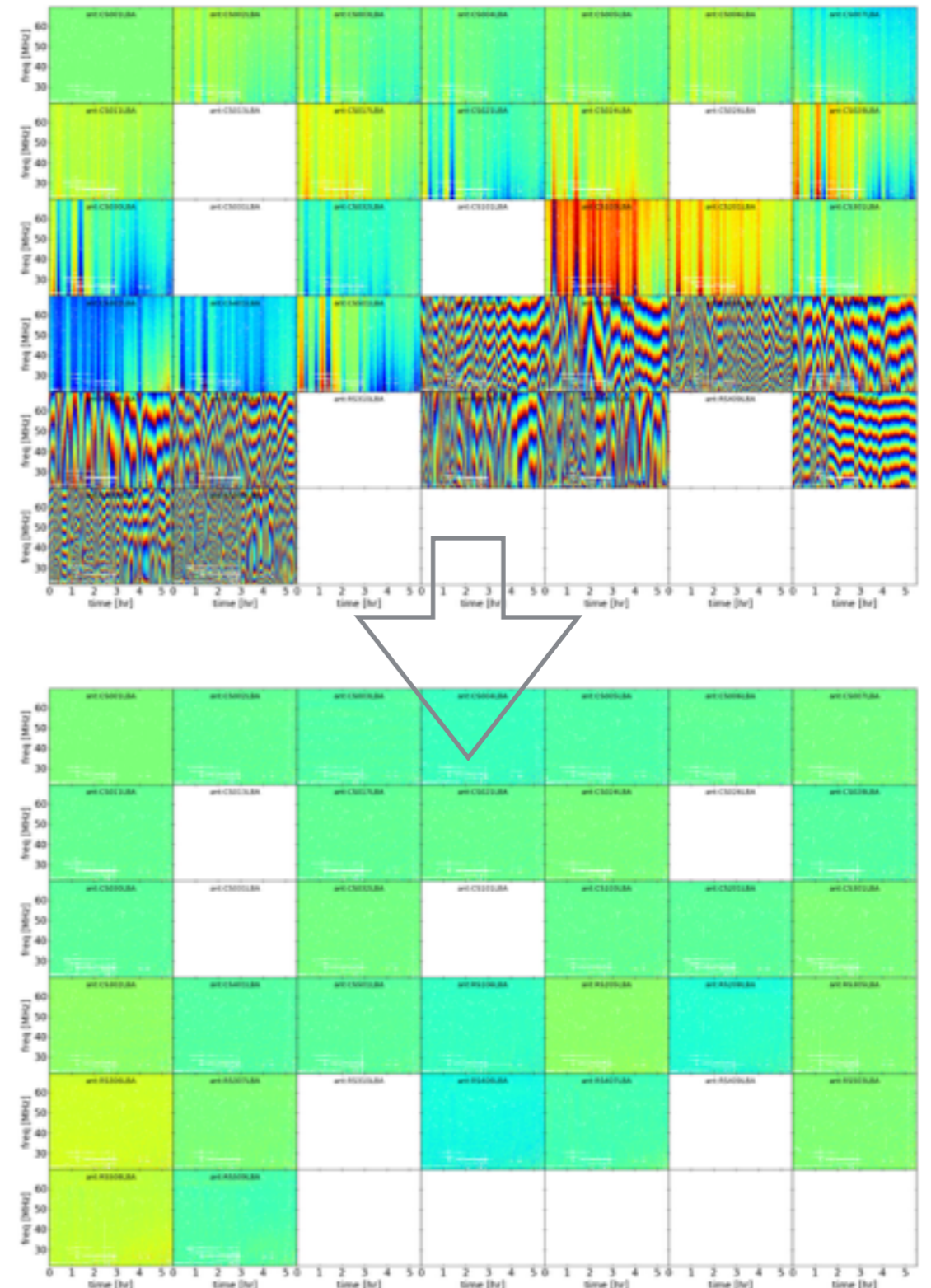
- Day-time observations
- 8 hrs per pointing (total)
- 3 beams per observation + 1 calibrator
- Switch targets each hours and cycle 8 sets of 3 targets each day



Calibration Strategy

PiLL: Pipeline for LOFAR LBA

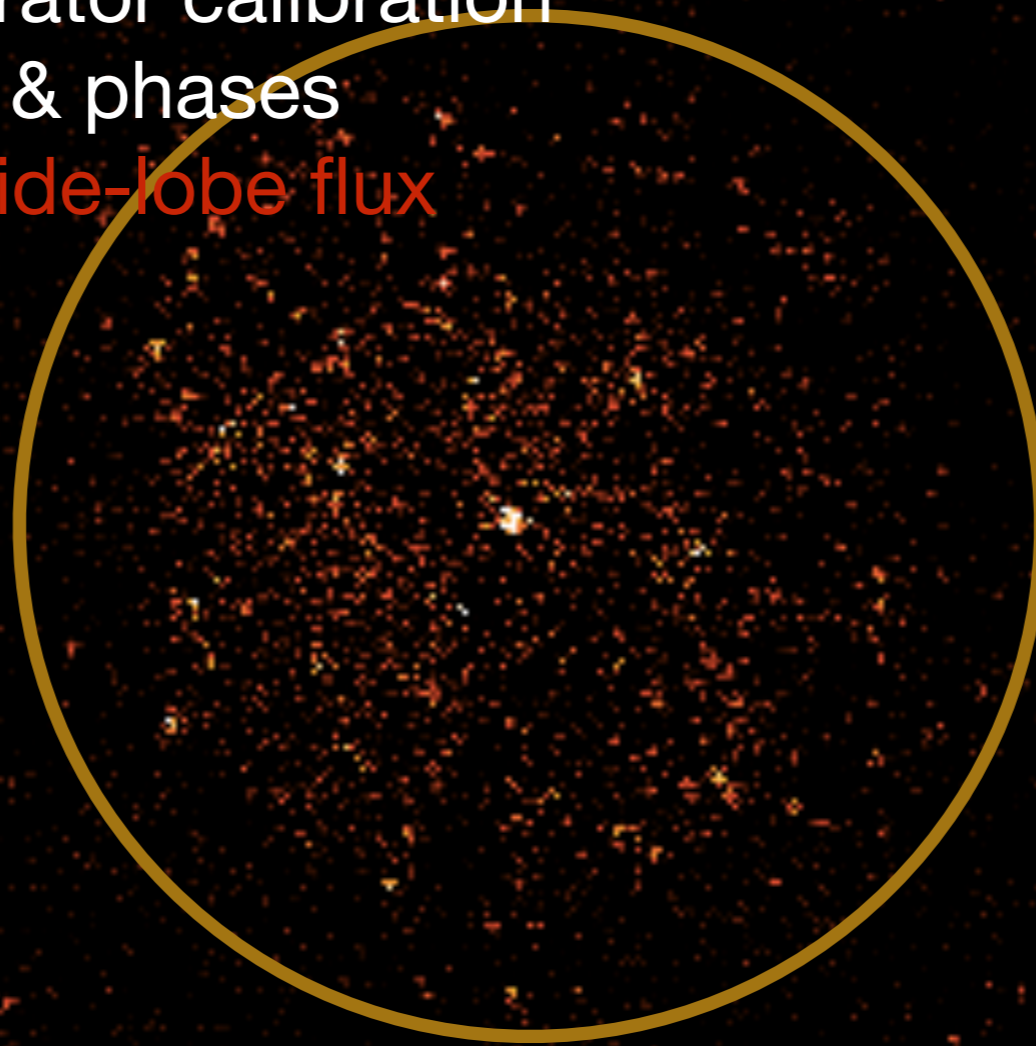
- Flag/demix/avg (observatory)
- “Brute-force” calibrator calibration
- Transfer bandpass & phases
- Removal primary side-lobe flux
- Selfcal (DIE):
 - TEC
 - Faraday rotation
 - Cross-delay
 - Amplitude-beam



Calibration Strategy

PiLL: Pipeline for LOFAR LBA

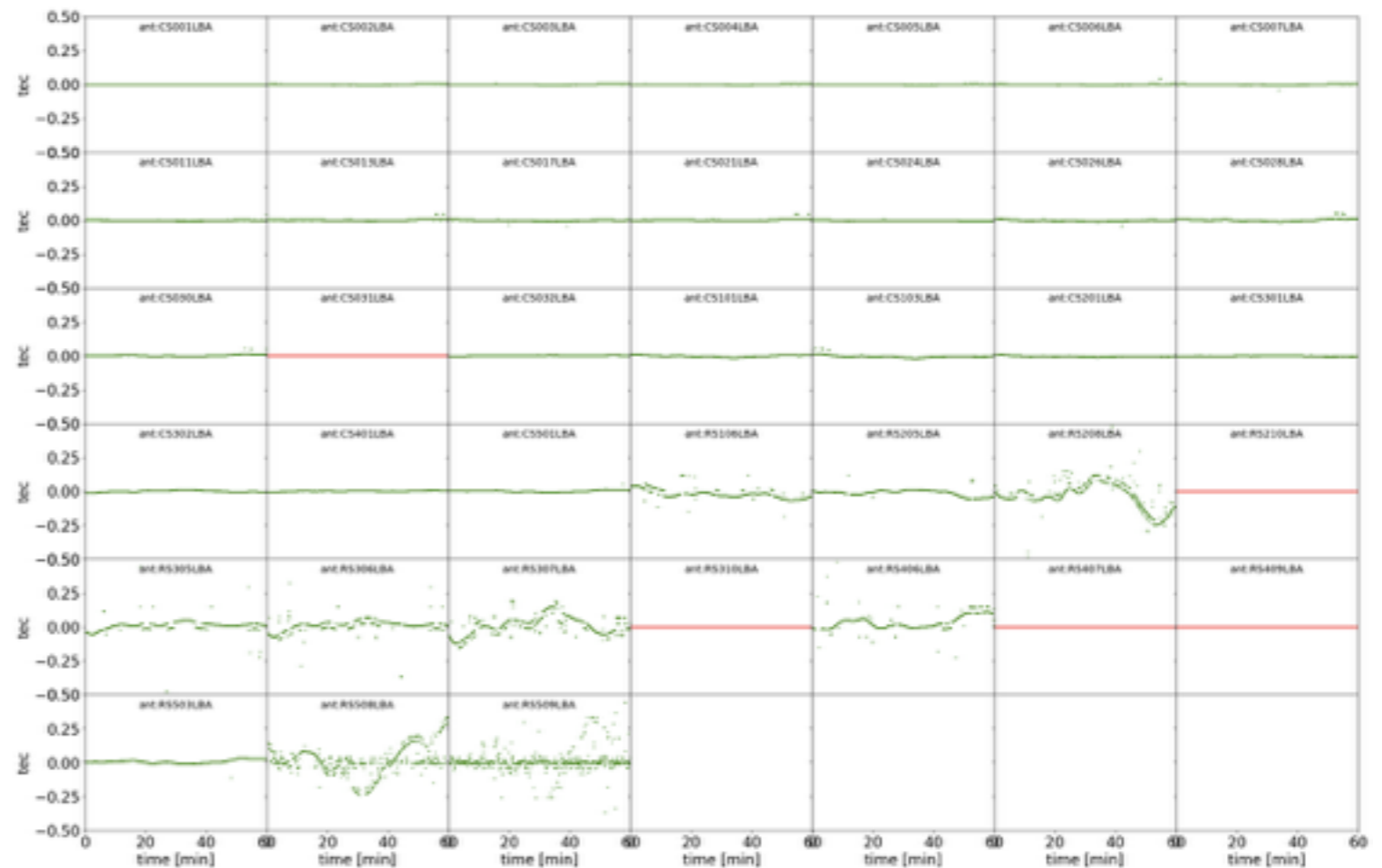
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Calibration Strategy

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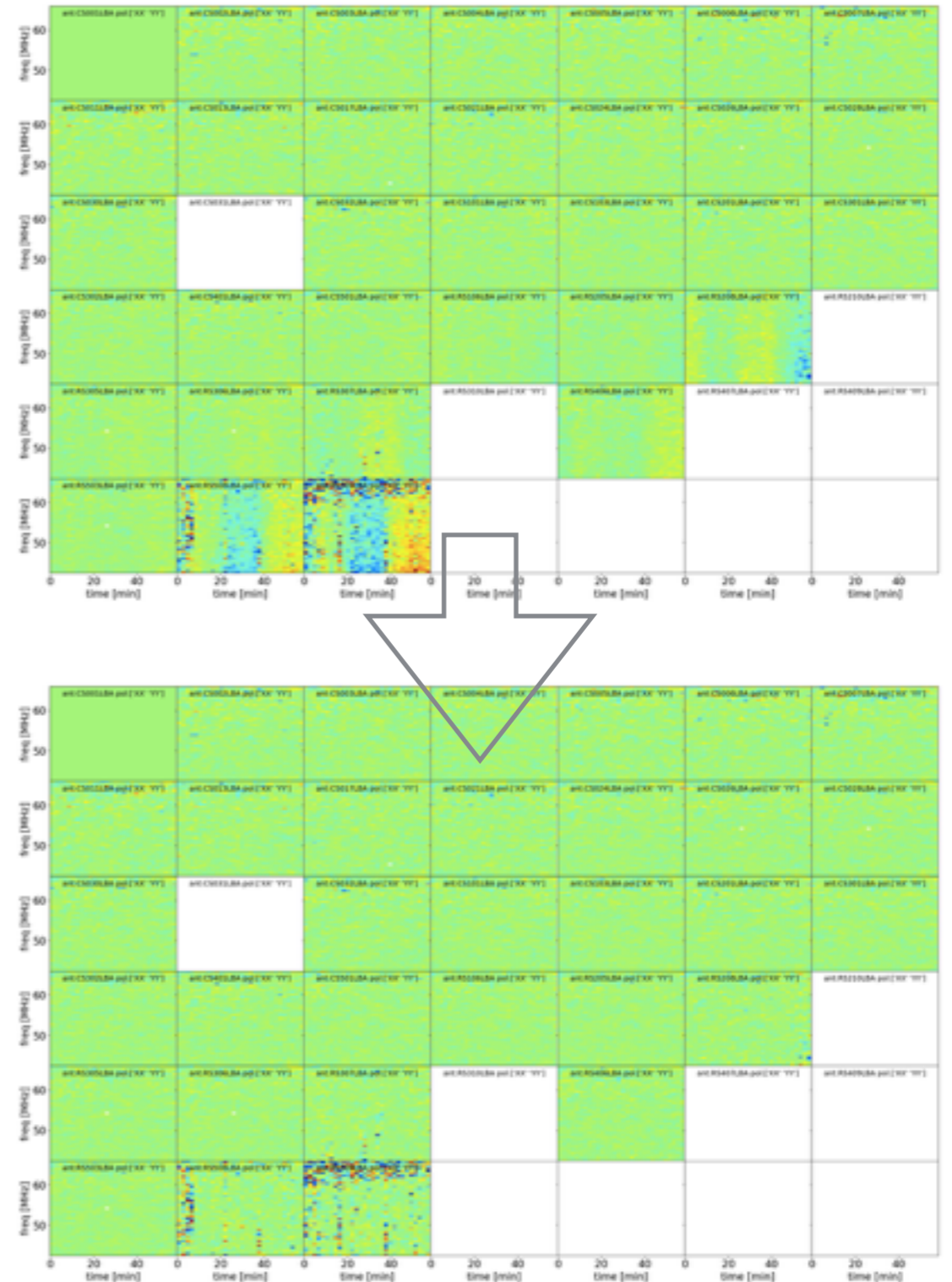
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 - Cross-delay
 - Amplitude-beam



Calibration Strategy

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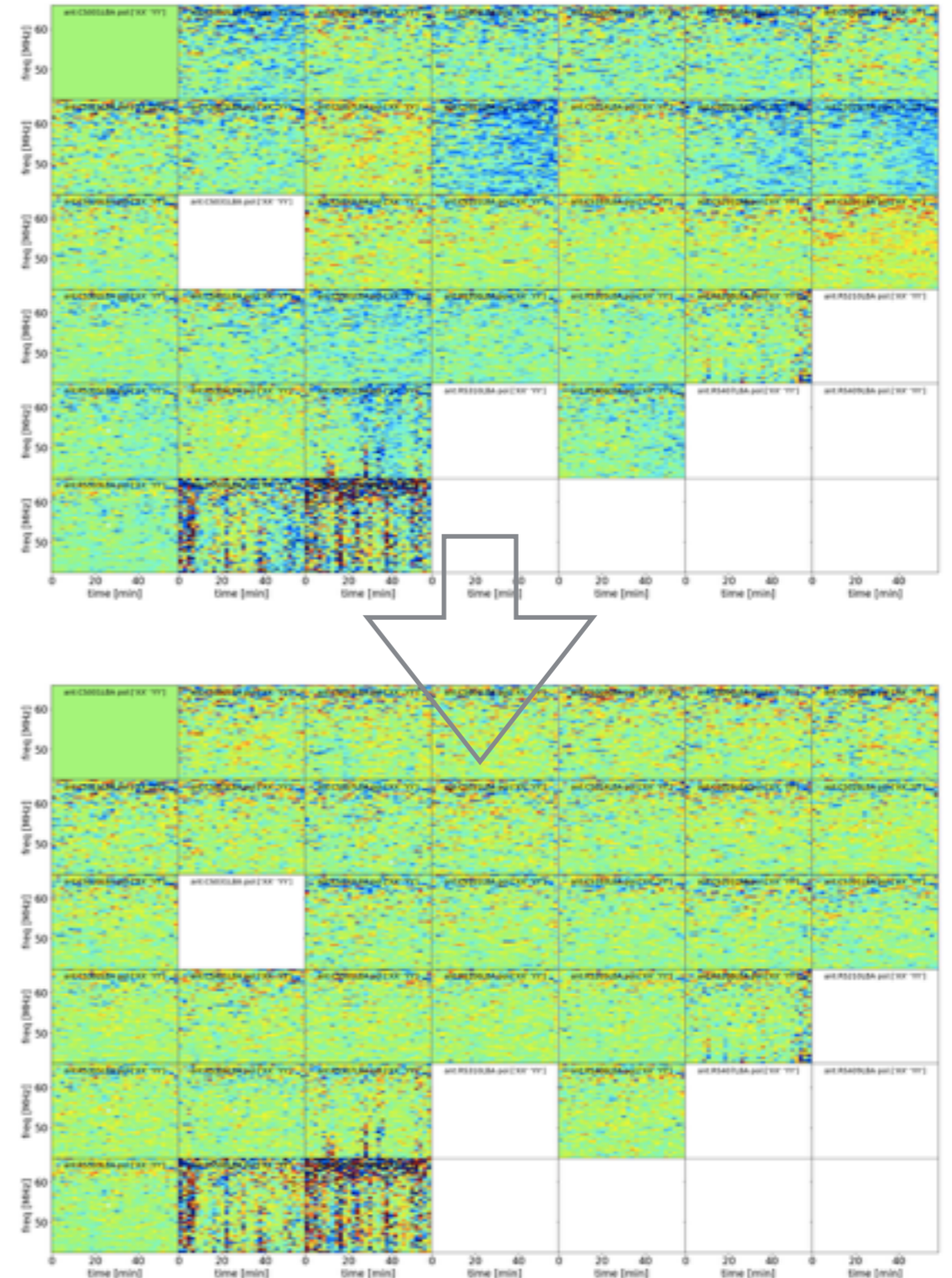
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Calibration Strategy

PiLL: Pipeline for LOFAR LBA

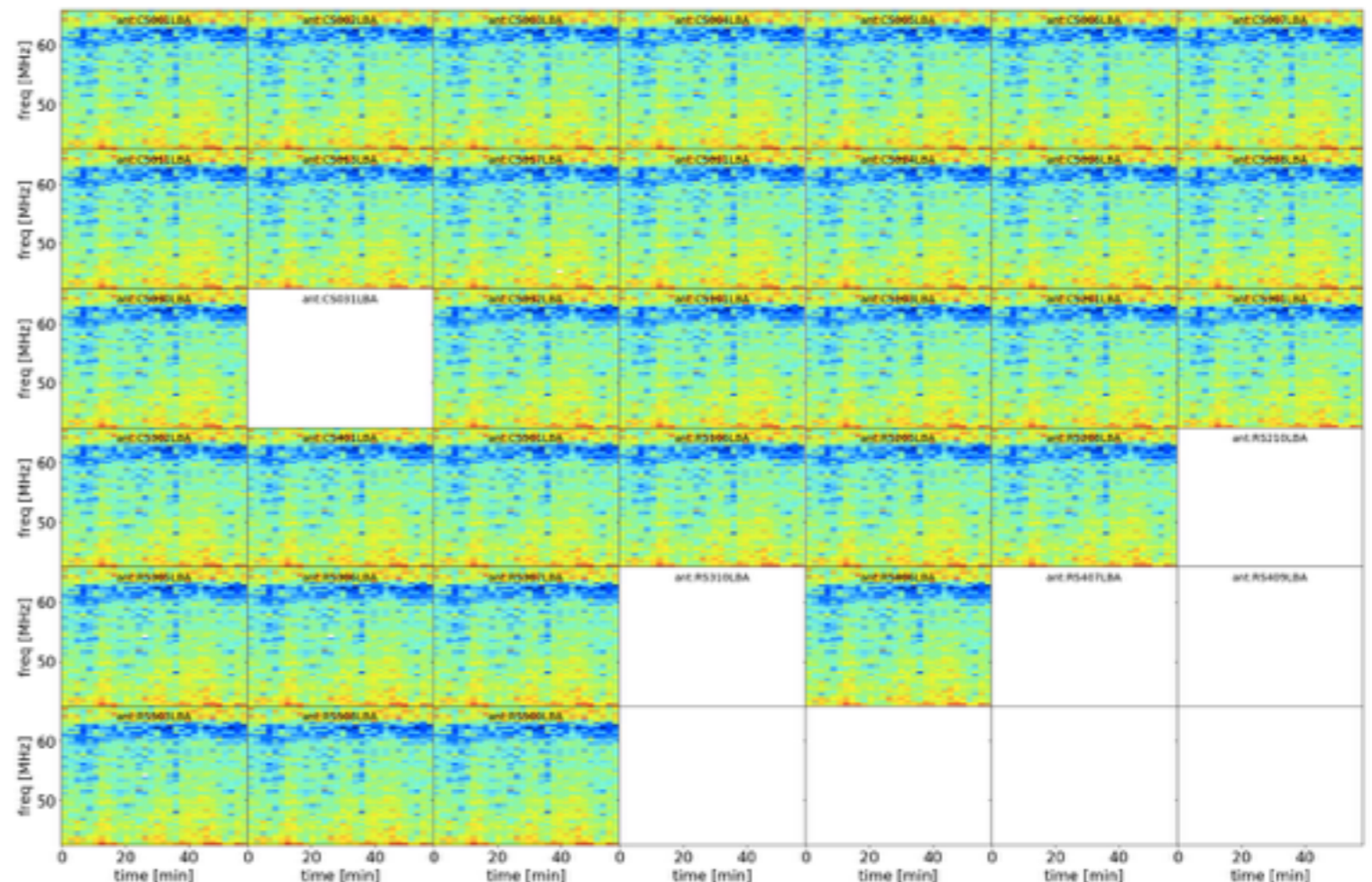
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 - **Cross-delay**
 - Amplitude-beam

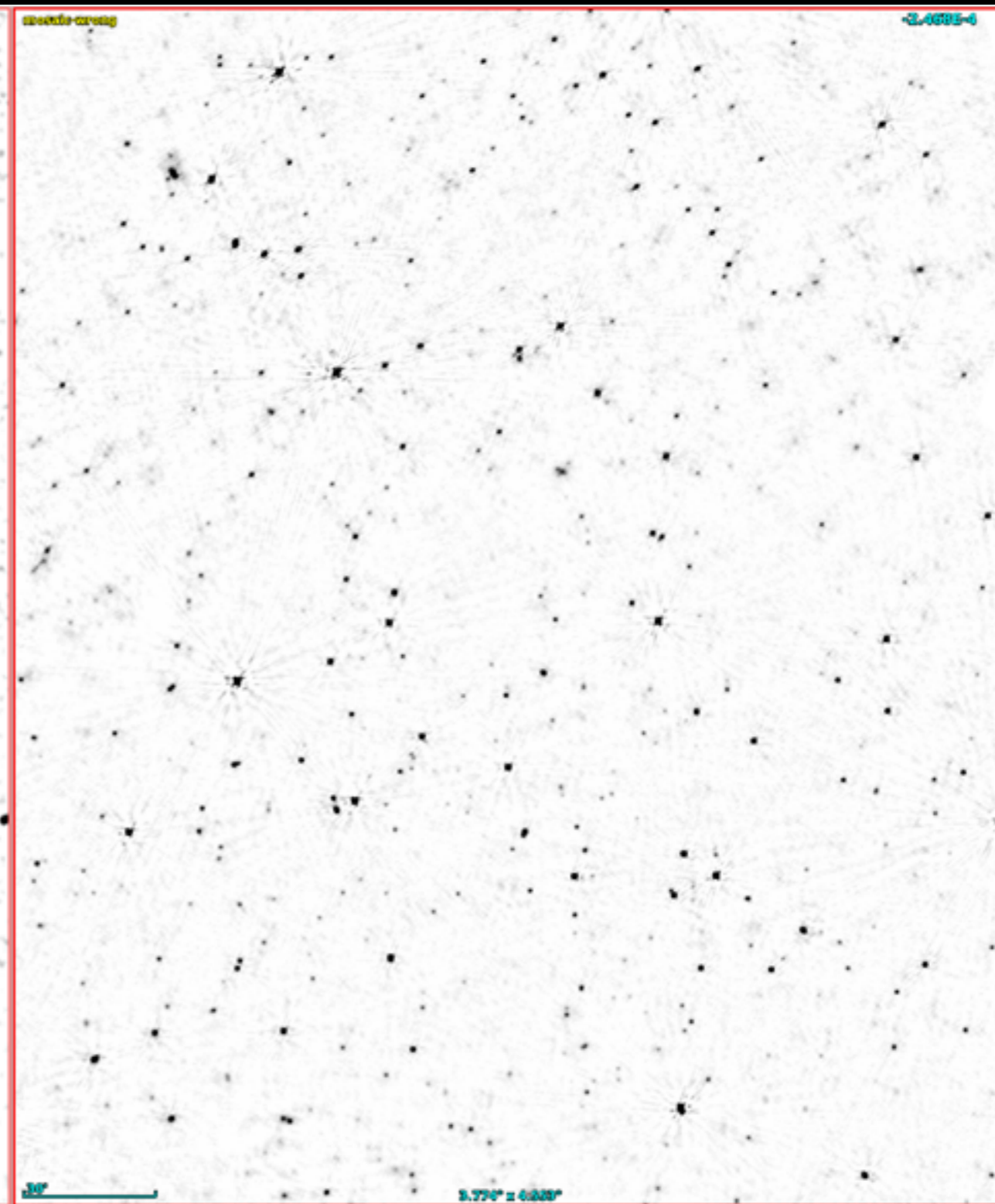


Calibration Strategy

PiLL: Pipeline for LOFAR LBA

- Flag/demix/avg (observatory)
- “Brute-force” calibrator calibration
- Transfer bandpass & phases
- Removal primary side-lobe flux
- Selfcal (DIE):
 - TEC
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 - Cross-delay
 - **Amplitude-beam**



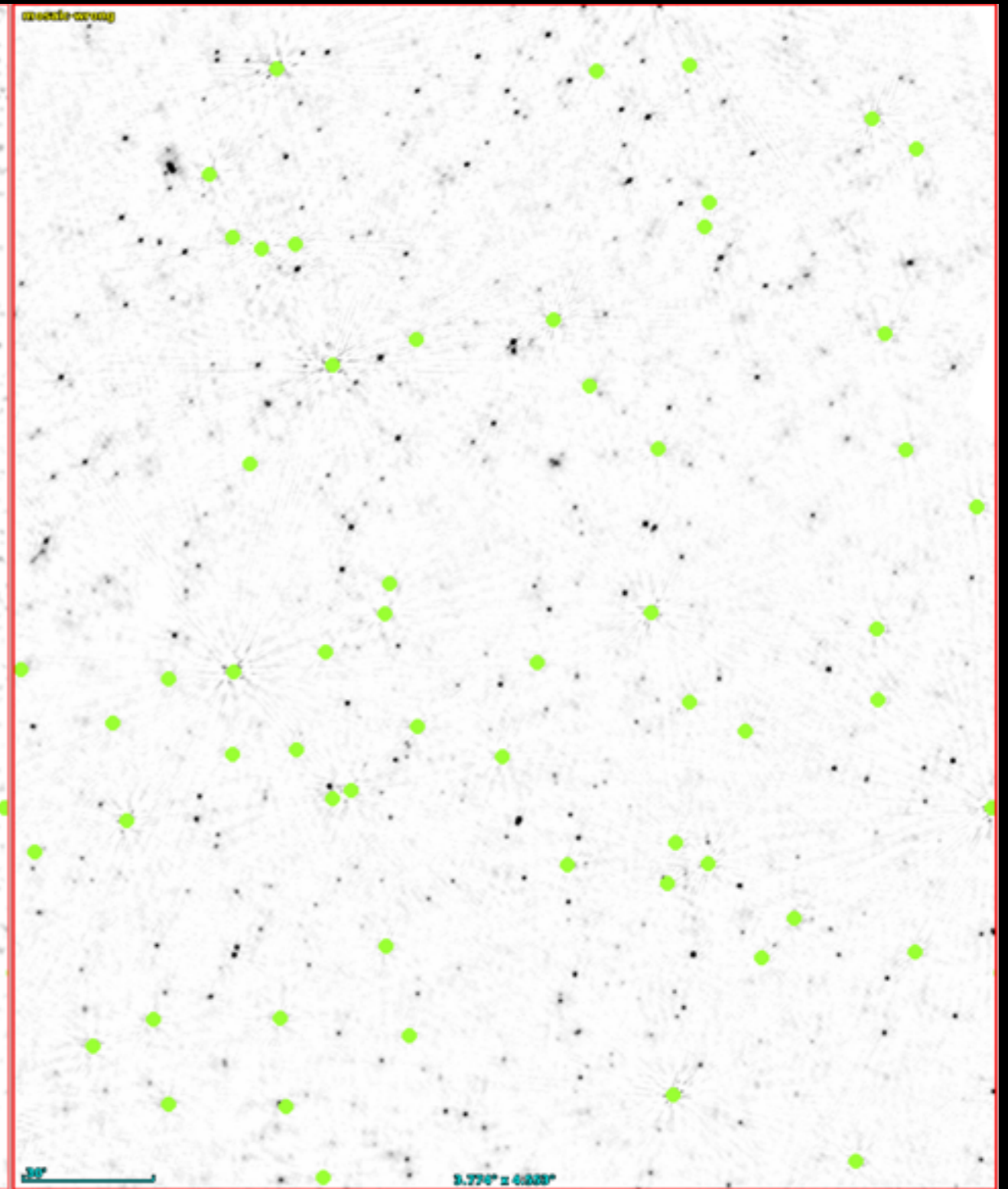
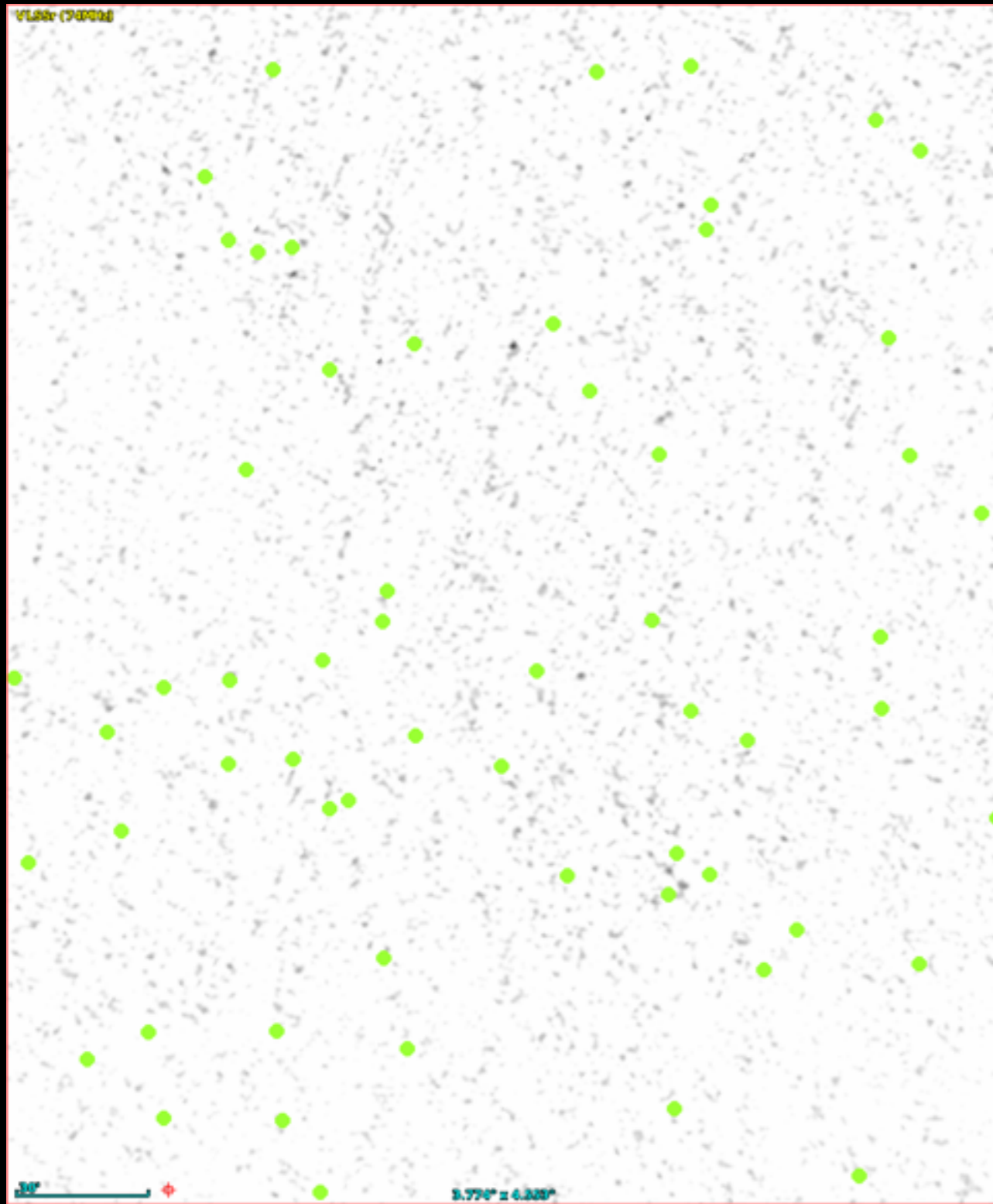


VLSSr

74 MHz, 100 mJy/b, 75"

LoLSS

54 MHz, 5 mJy/b, 45"

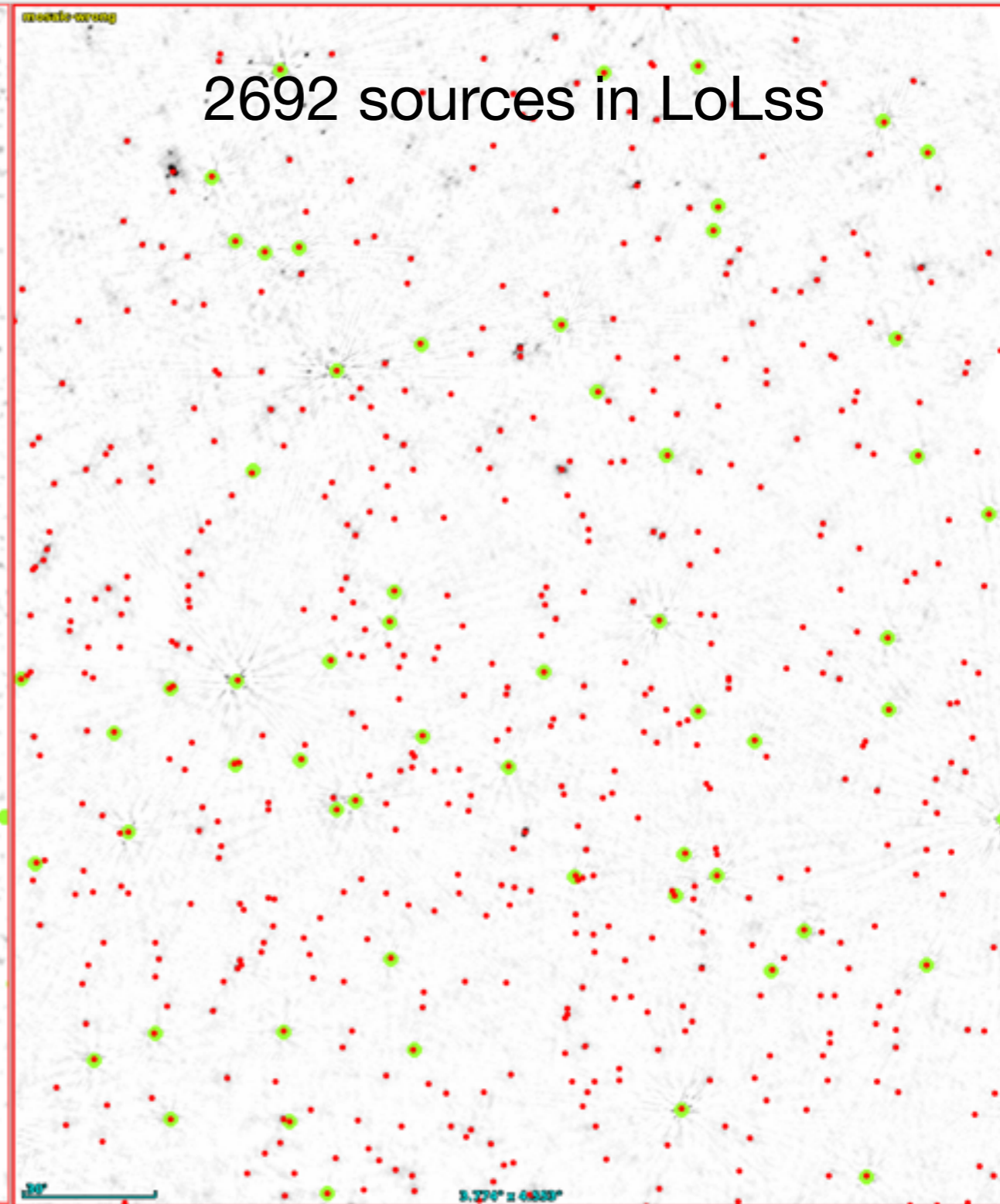
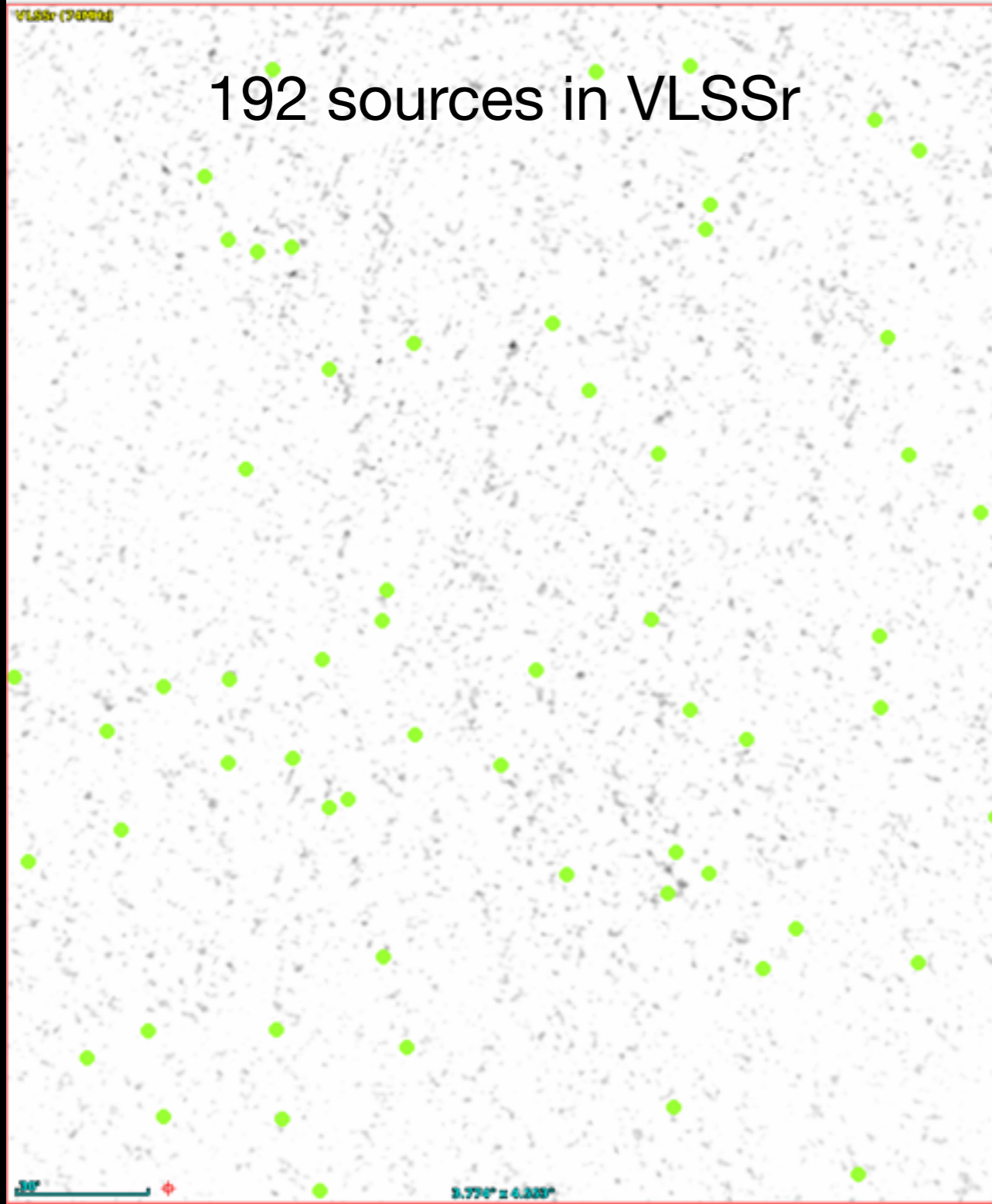


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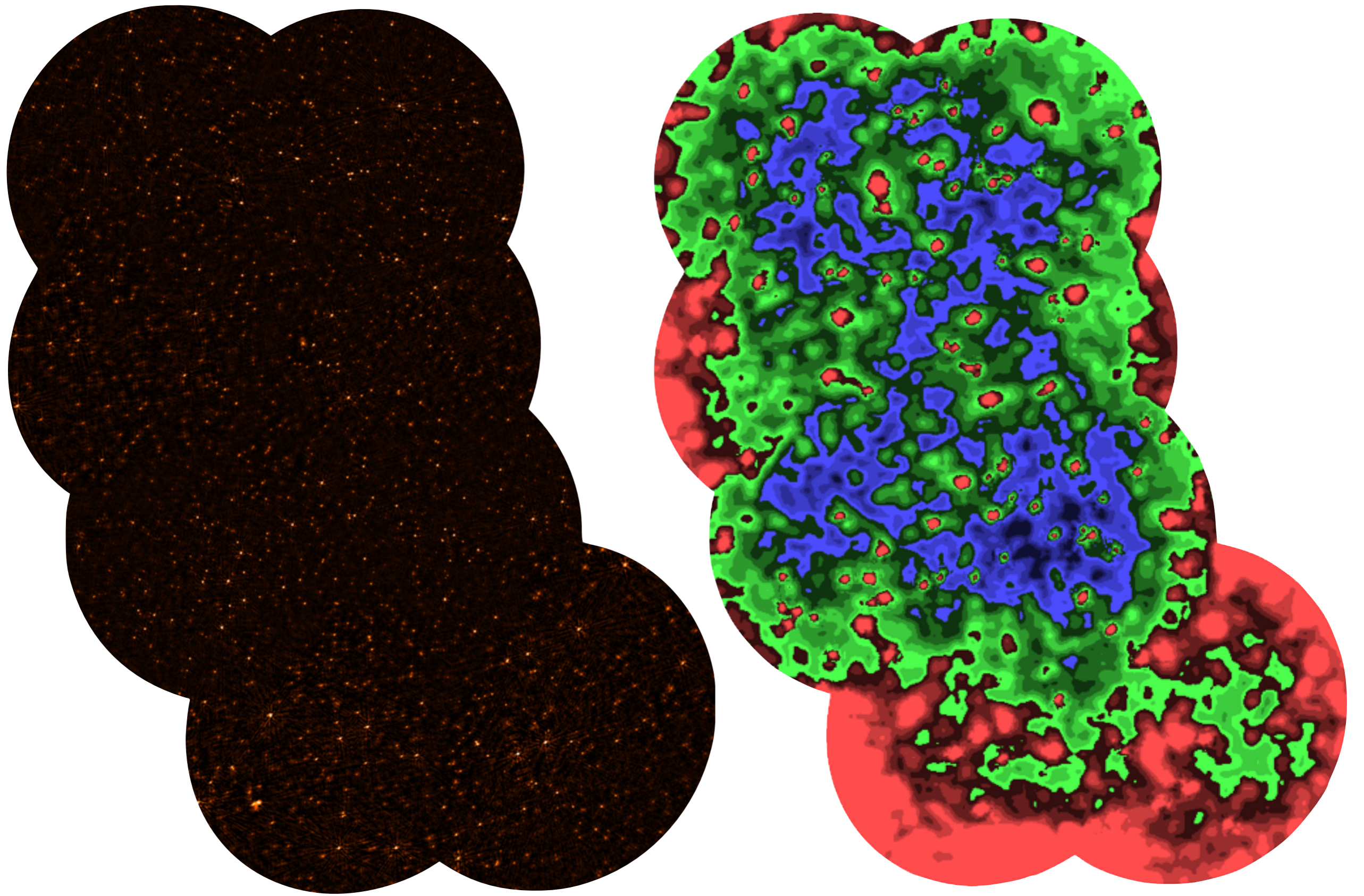


VLSsr

74 MHz, 100 mJy/b, 75"

LoLss

54 MHz, 5 mJy/b, 45"



2 mJy/b

4 mJy/b

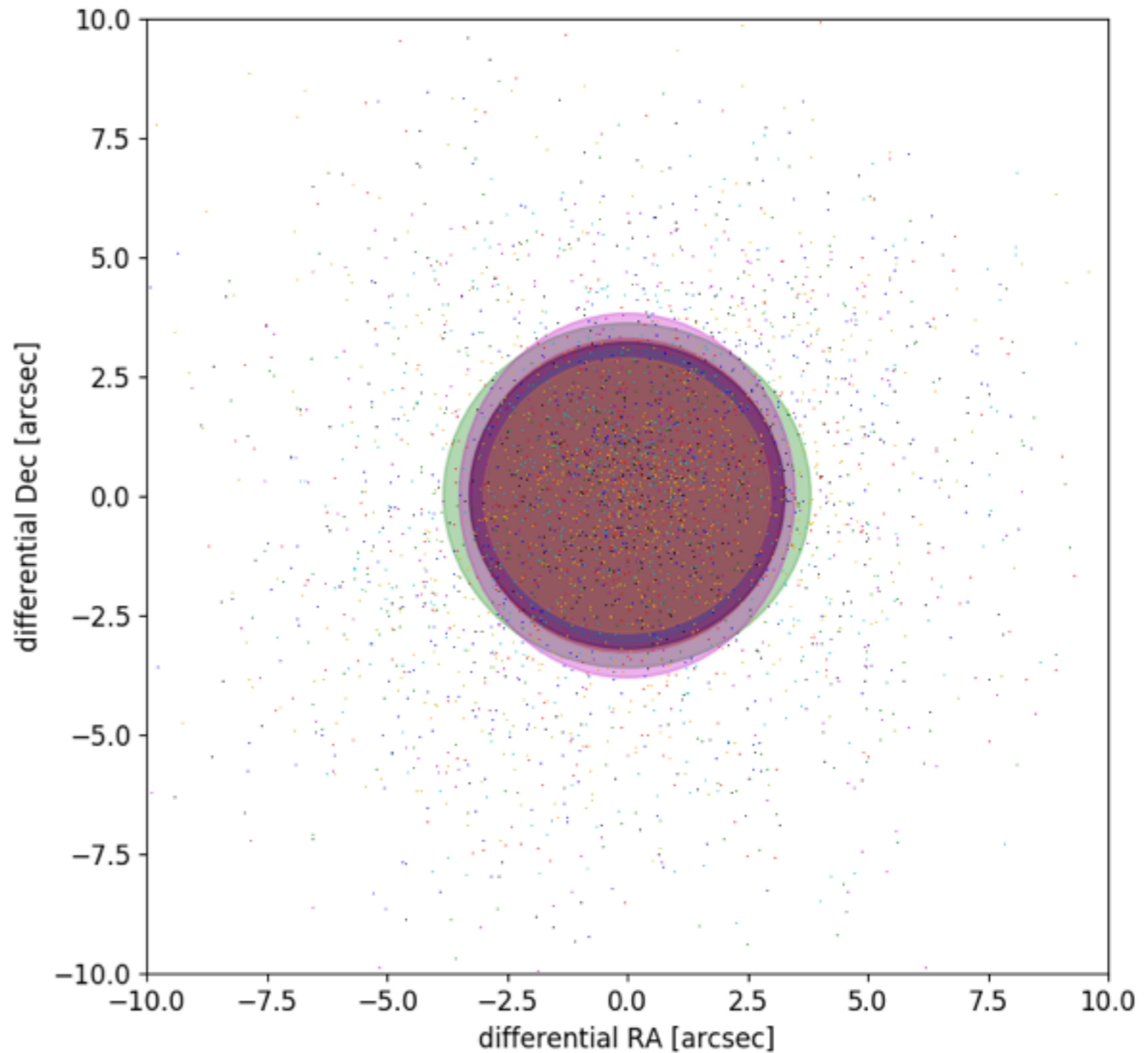
6 mJy/b

10 mJy/b



Astrometry

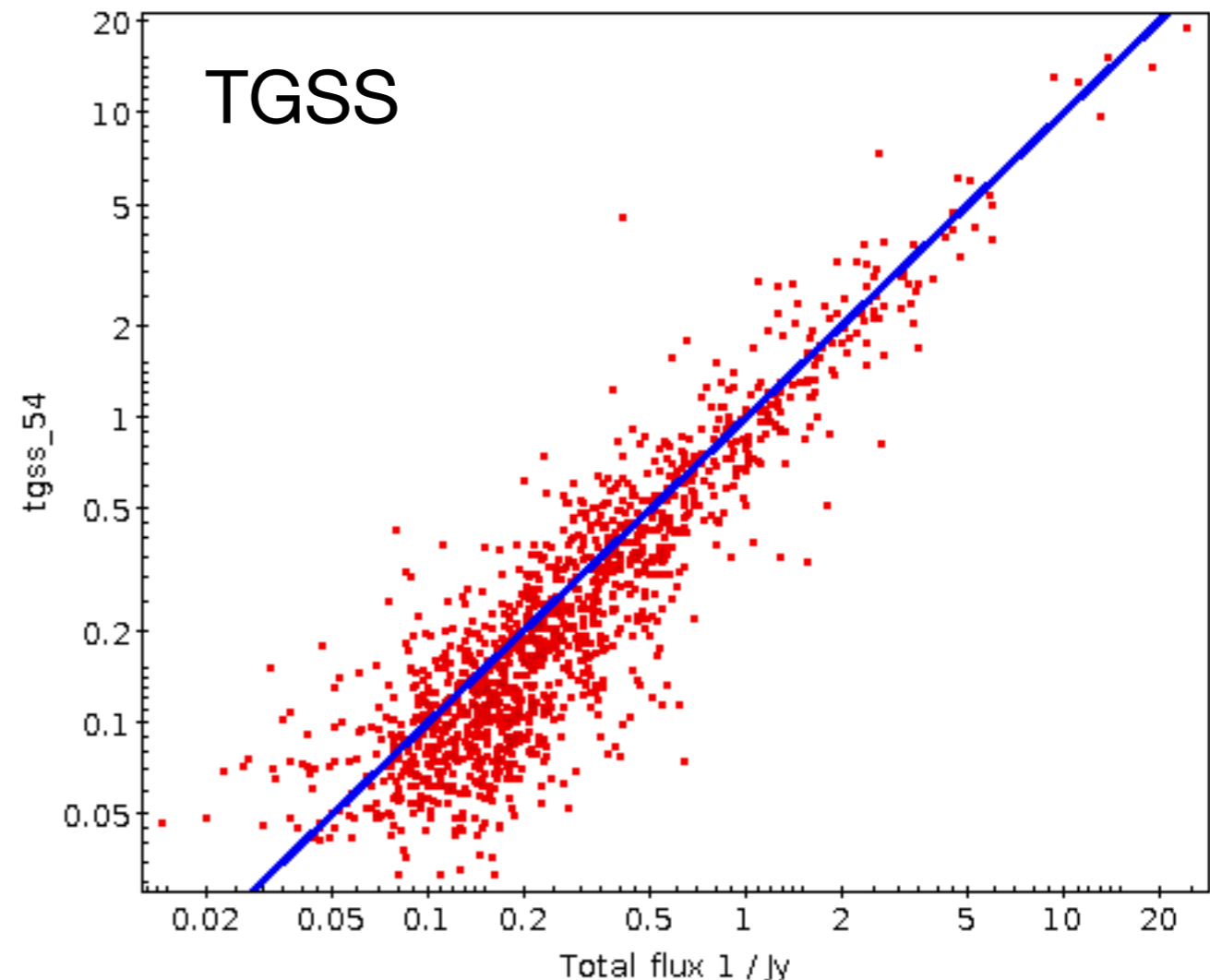
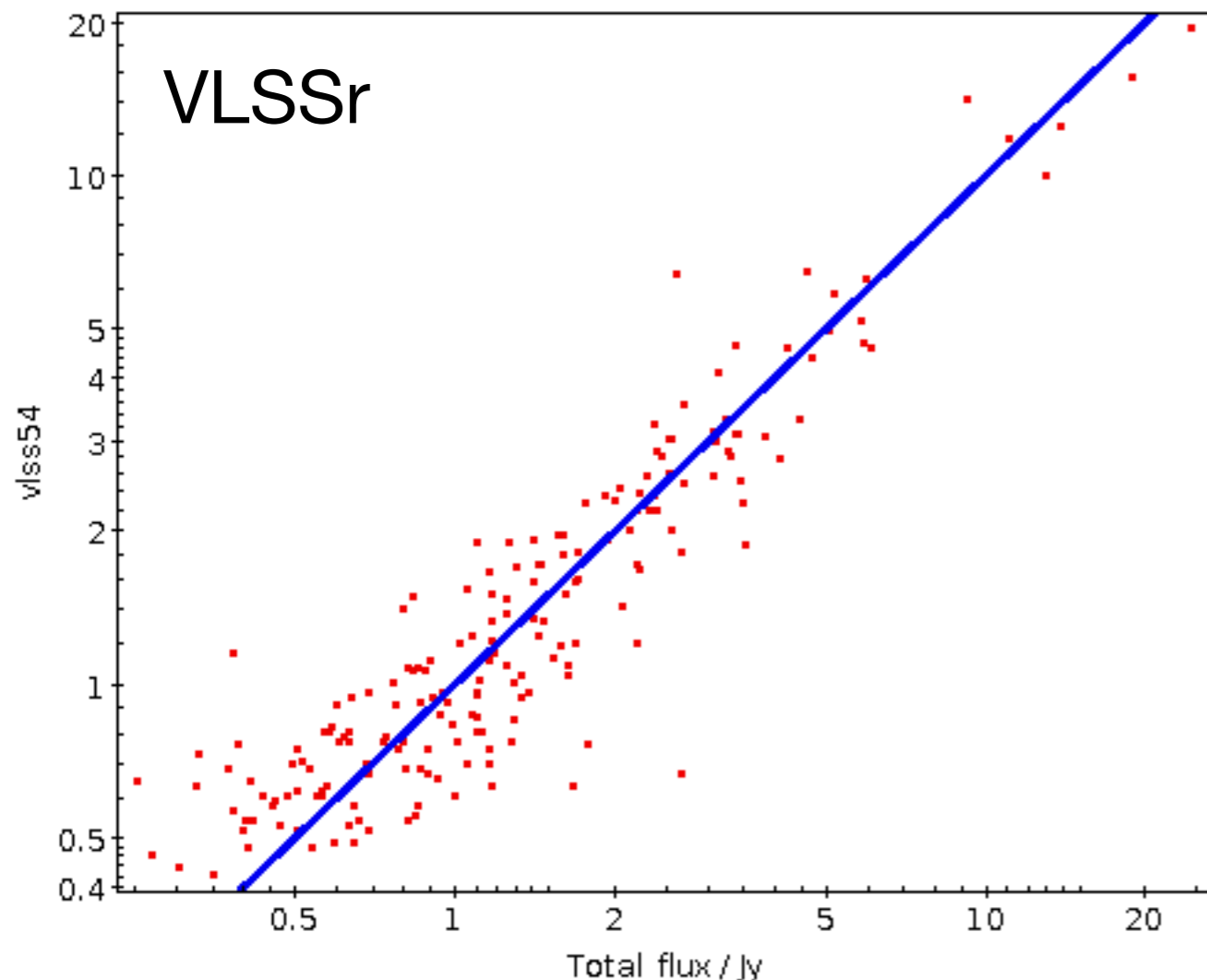
		RA		Dec
0:	mean	=	+1".01 /	+0".31
1:	mean	=	-0".90 /	-1".40
2:	mean	=	+0".55 /	+0".74
3:	mean	=	+0".08 /	-1".86
4:	mean	=	-2".65 /	+1".68
5:	mean	=	+1".61 /	+0".15
6:	mean	=	+3".28 /	-2".89
7:	mean	=	+1".10 /	+3".40
0:	std	=	3".27 /	3".20
1:	std	=	3".25 /	3".29
2:	std	=	3".82 /	3".61
3:	std	=	2".89 /	2".86
4:	std	=	2".94 /	3".08
5:	std	=	3".28 /	3".22
6:	std	=	2".98 /	2".88
7:	std	=	3".49 /	3".82

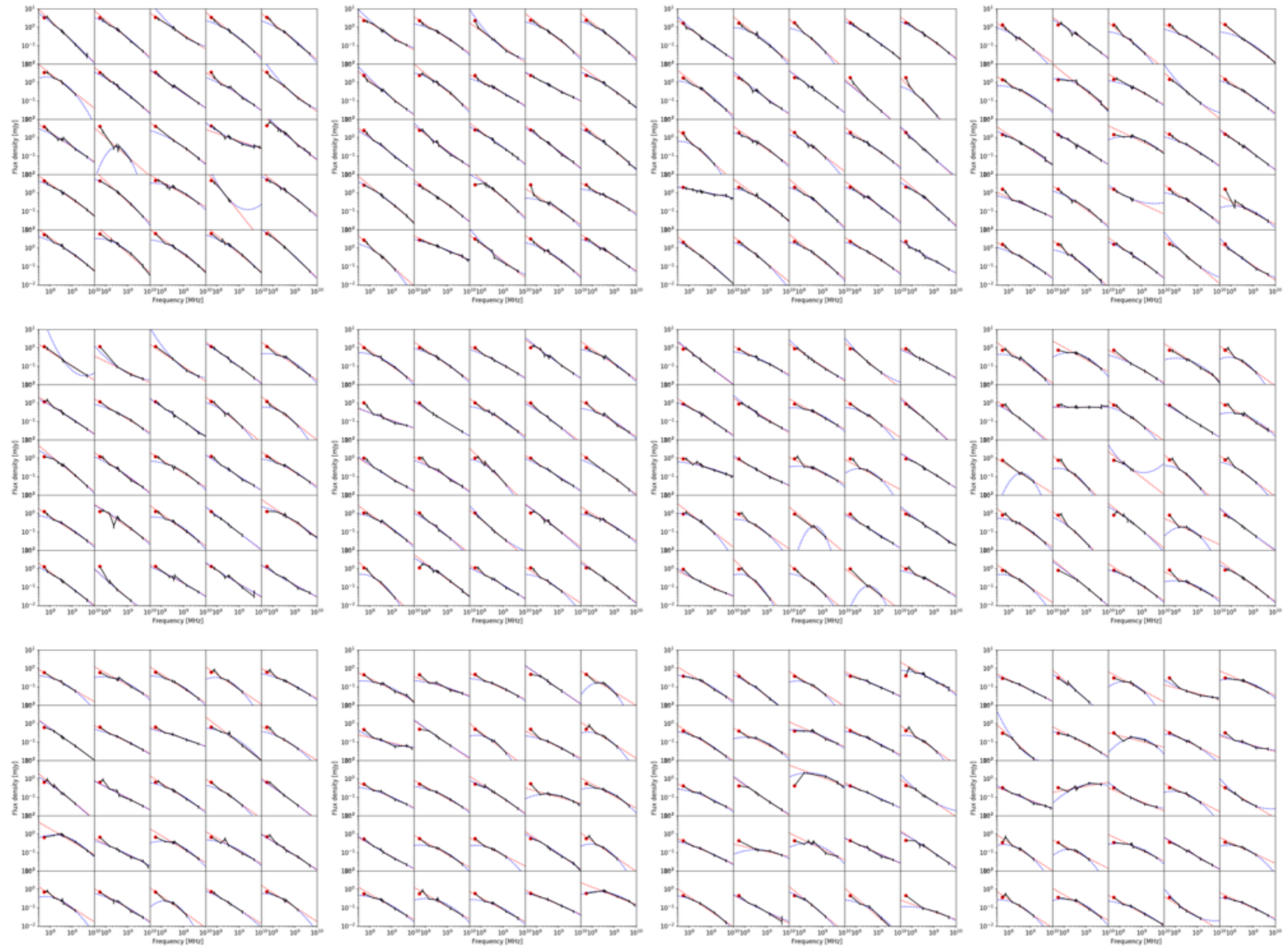


Flux accuracy

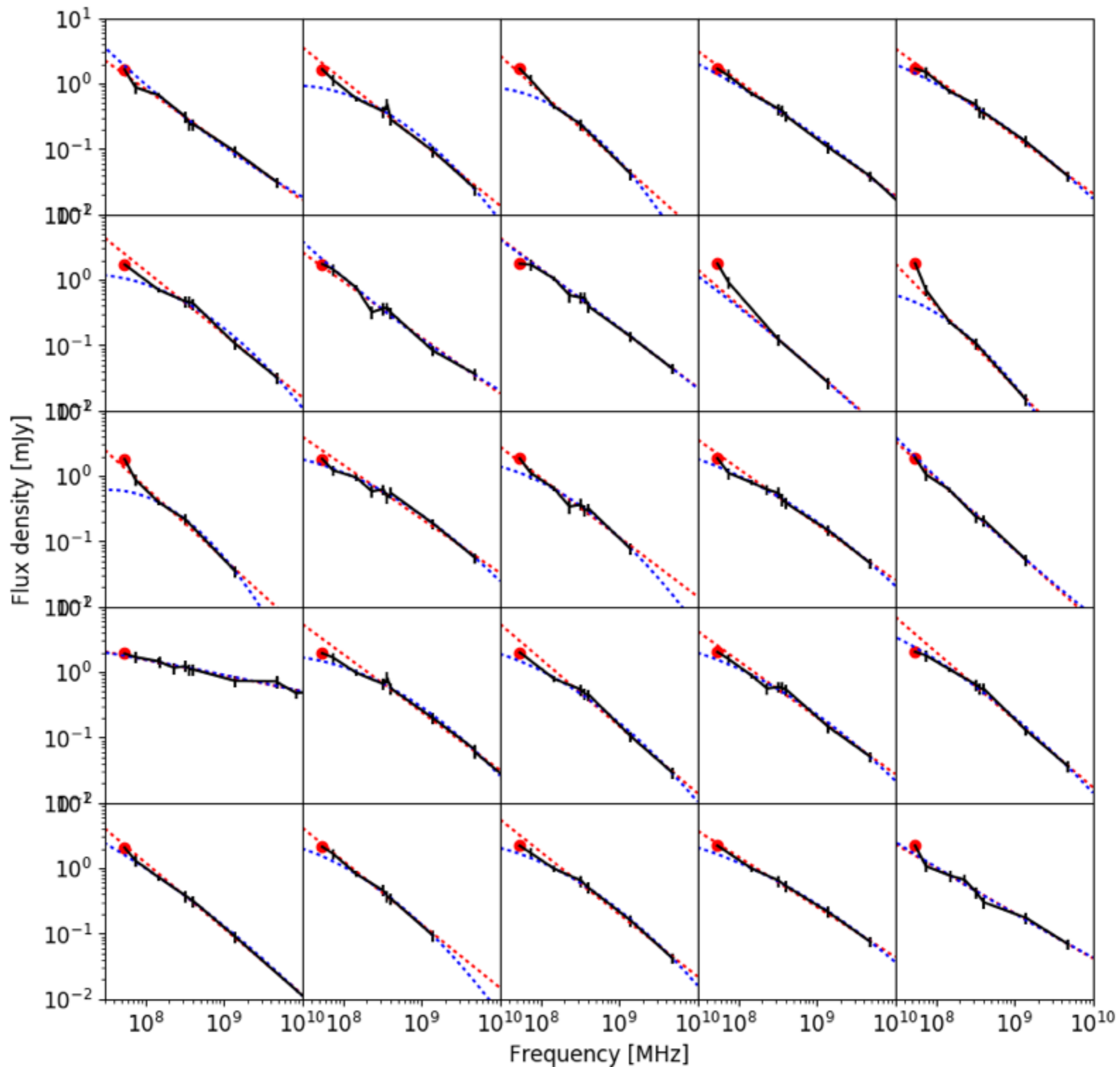
LoLss has no rescaling, flux estimated from calibrators.

- mean ratio LoLss/VLSSr = 1.04 (1.08 for flux > 0.5 Jy)
- mean ratio LoLss/TGSS = 1.37 (1.10 for flux > 0.5 Jy)



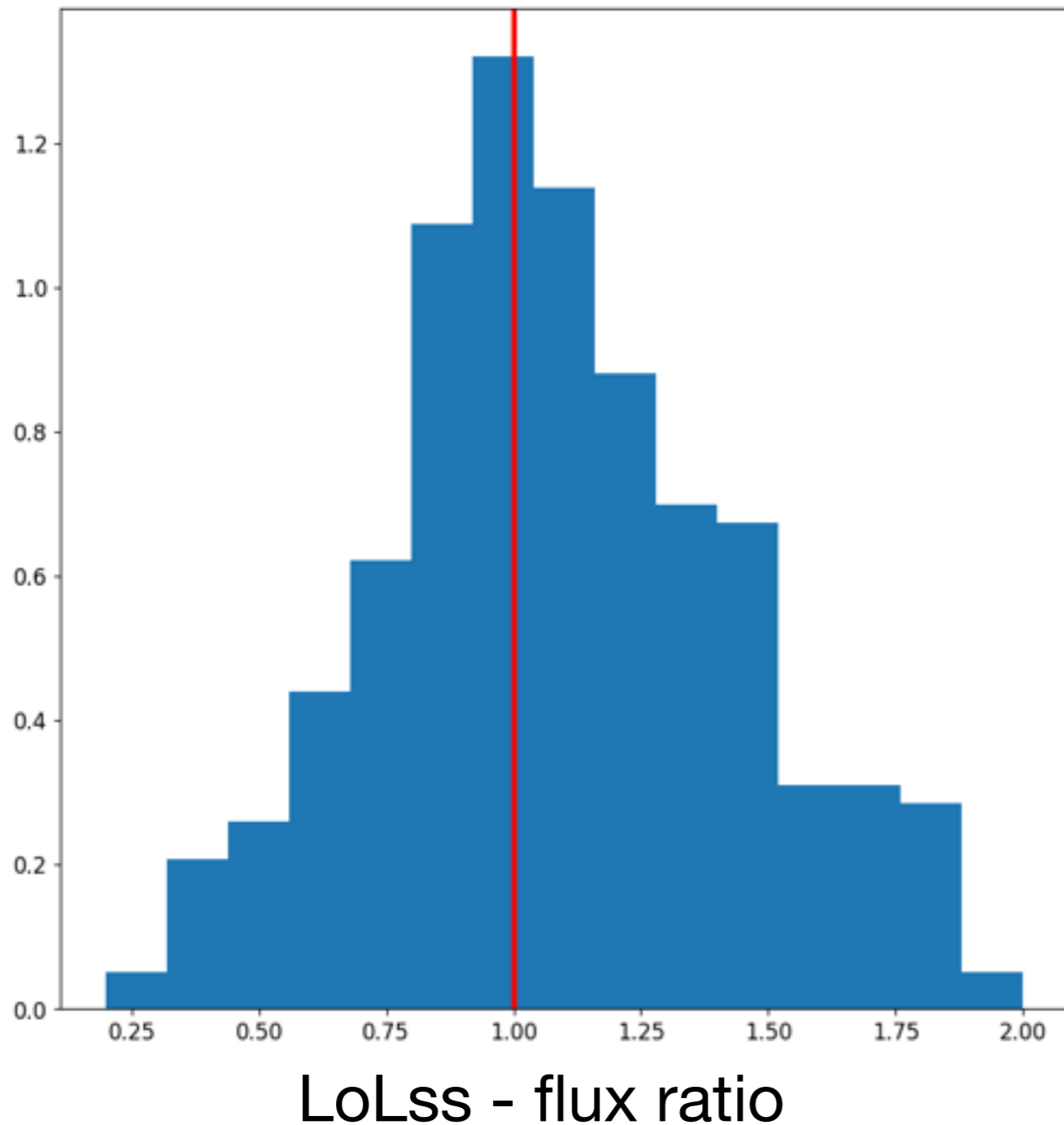


1st ord poly
2nd ord poly
data from specfind2.

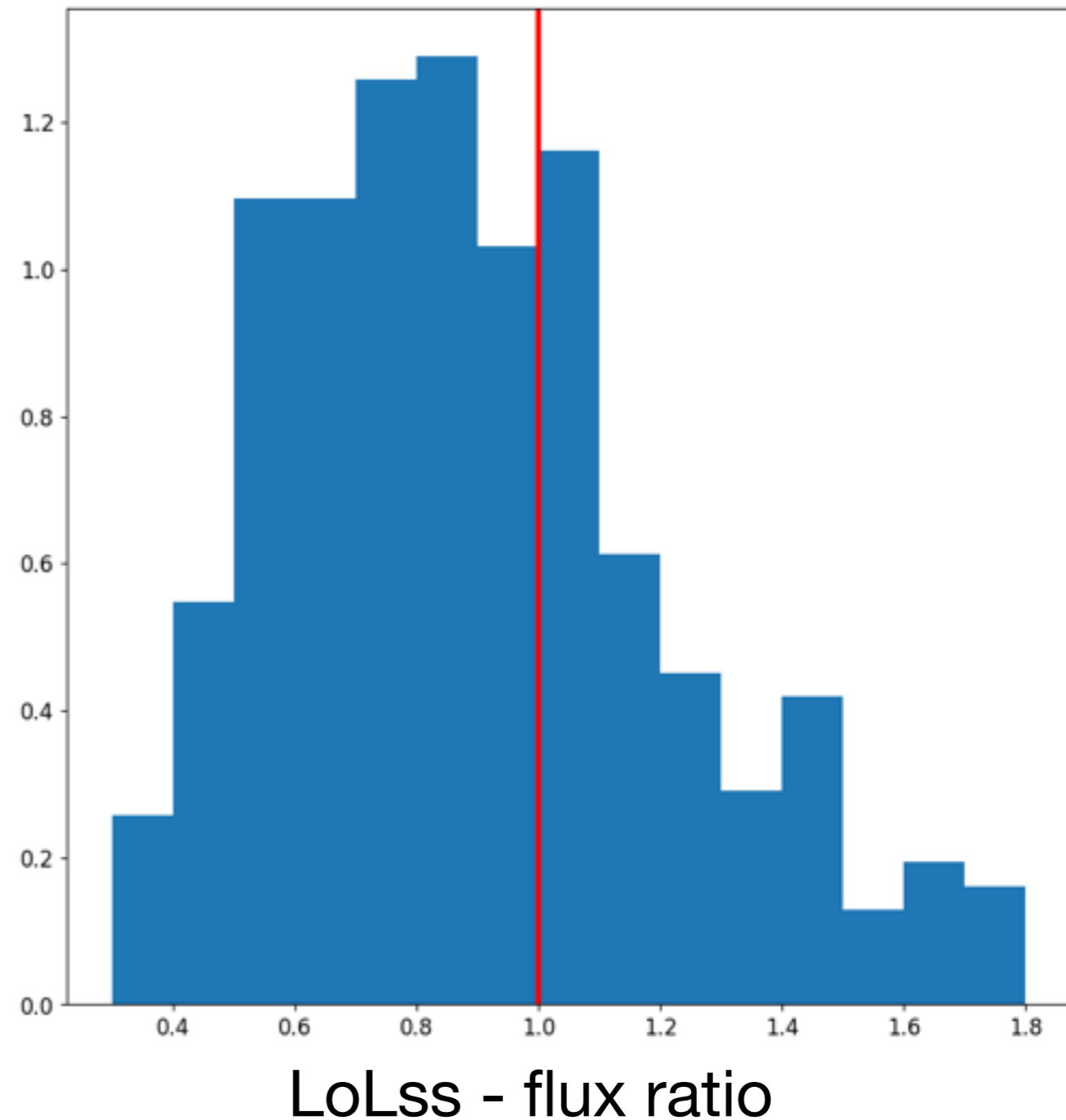


Flux accuracy

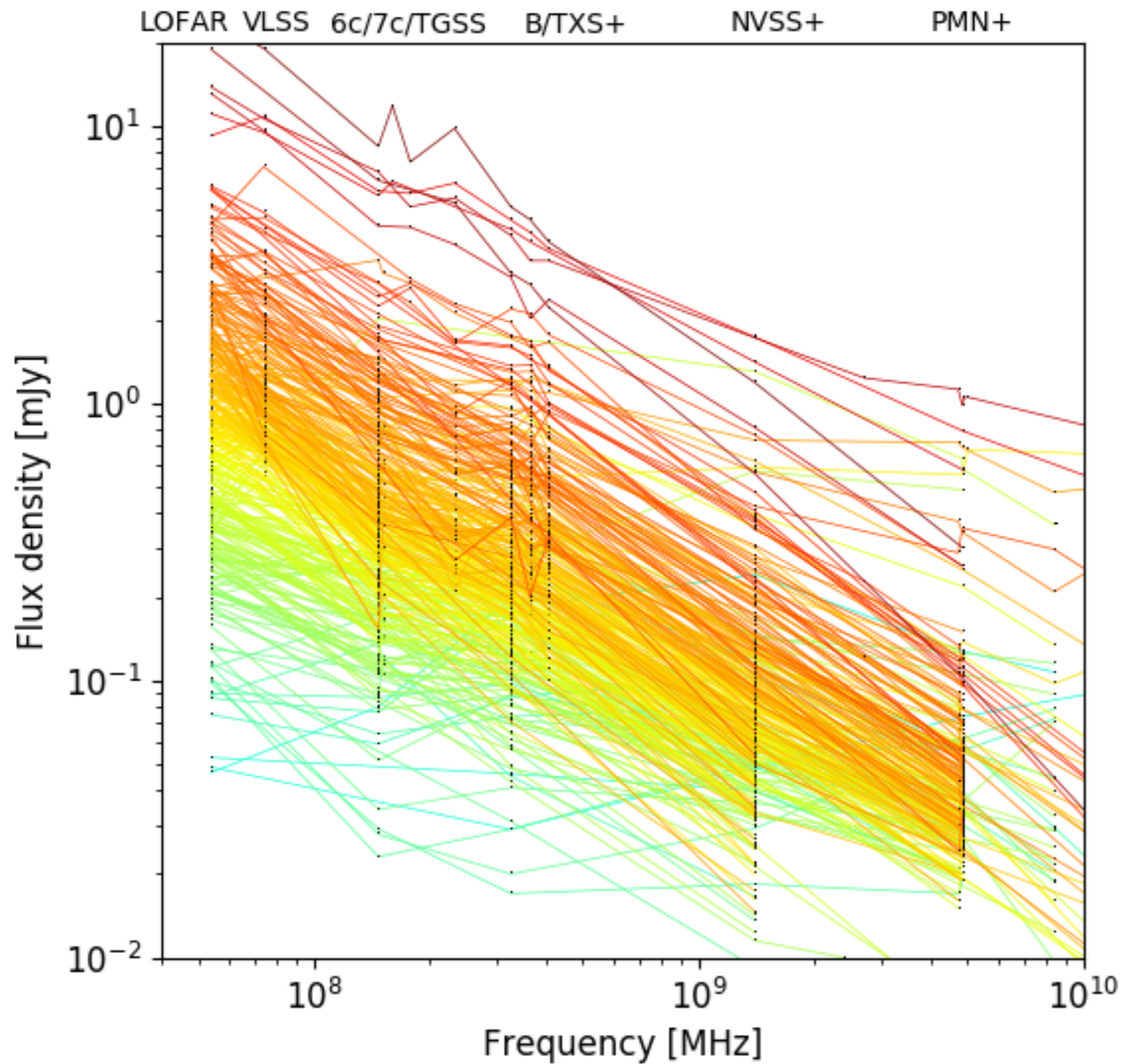
1st order (linear) fit prediction



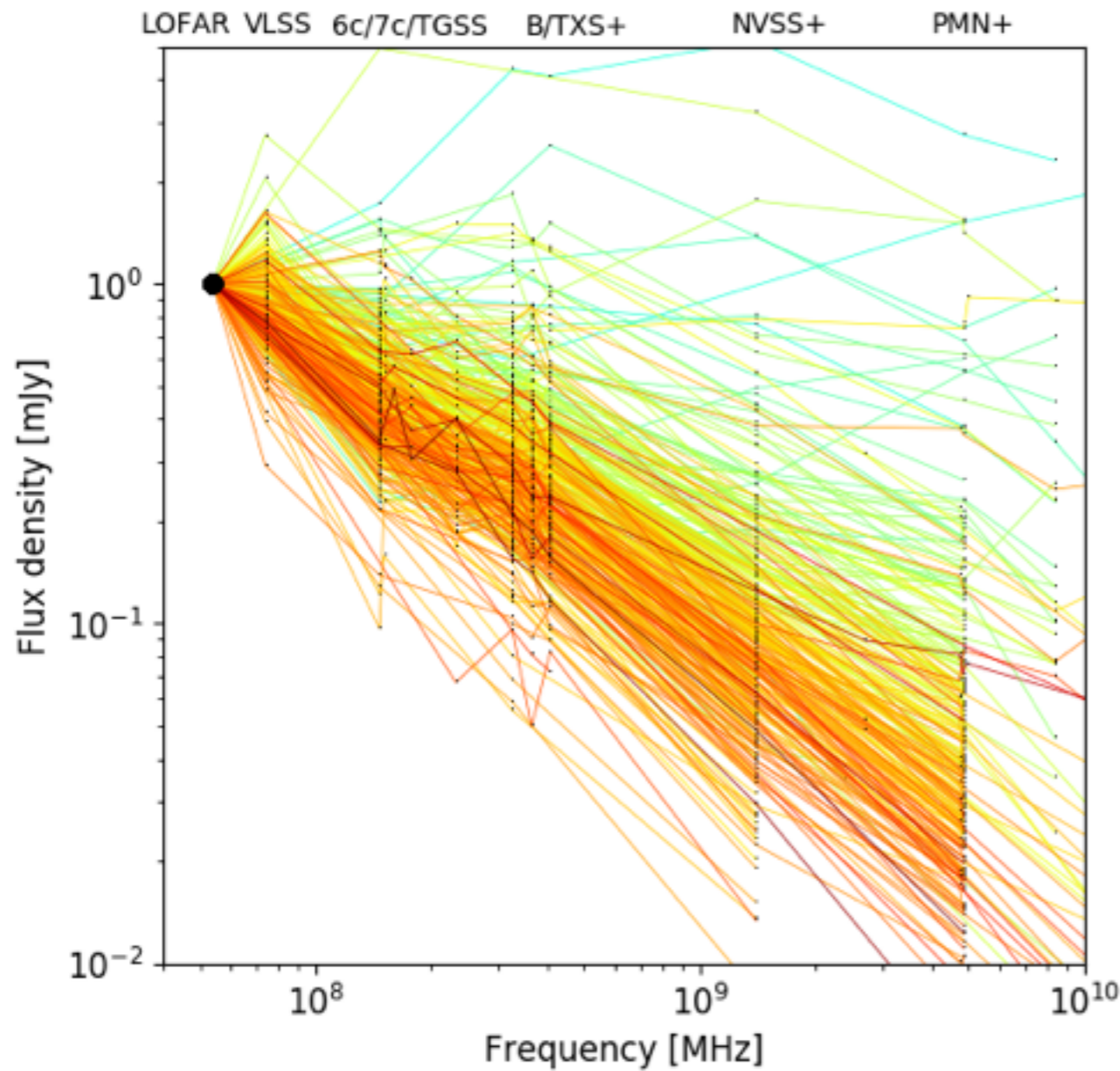
2nd order fit prediction



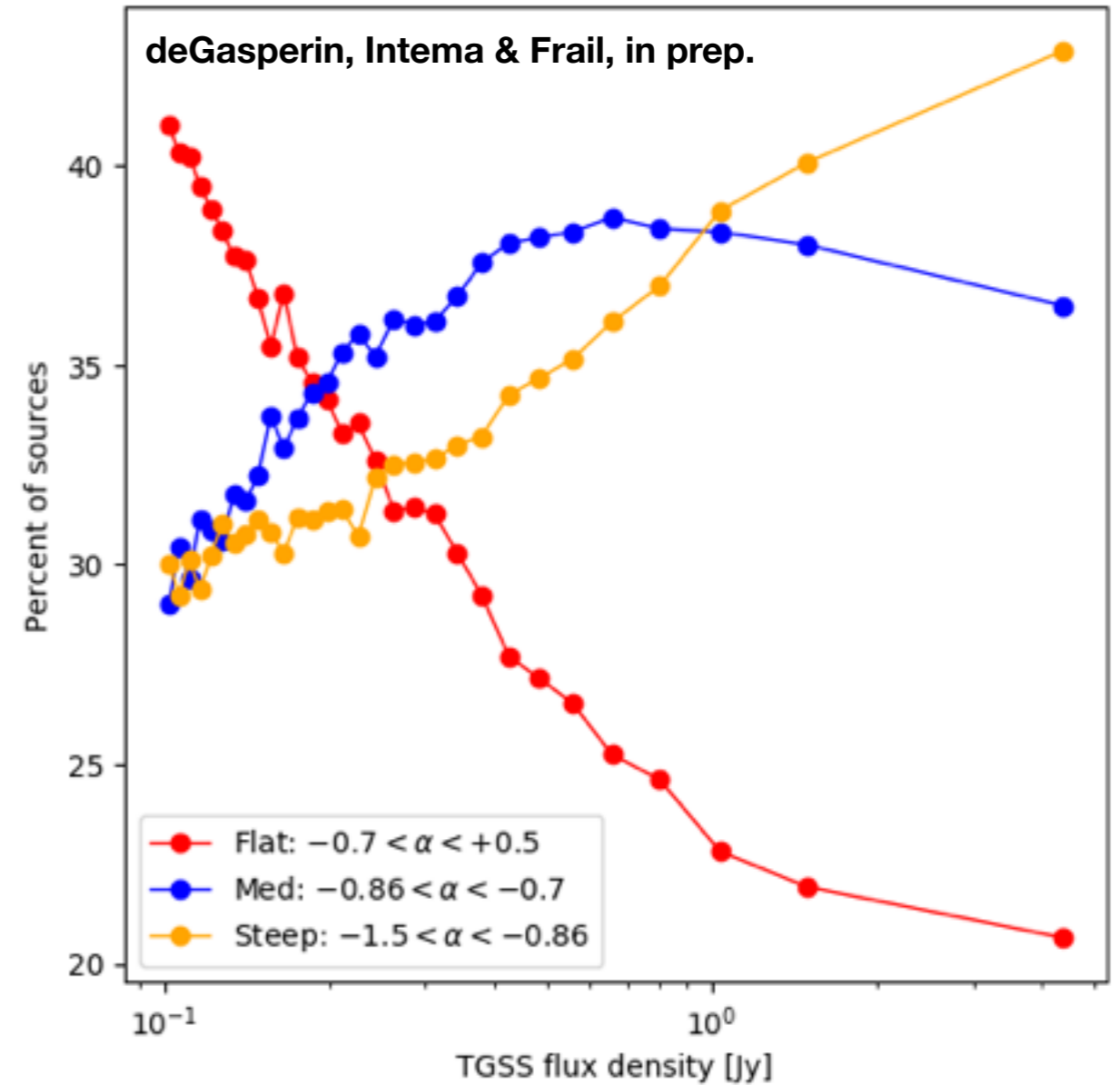
Radio spectra



Radio spectra

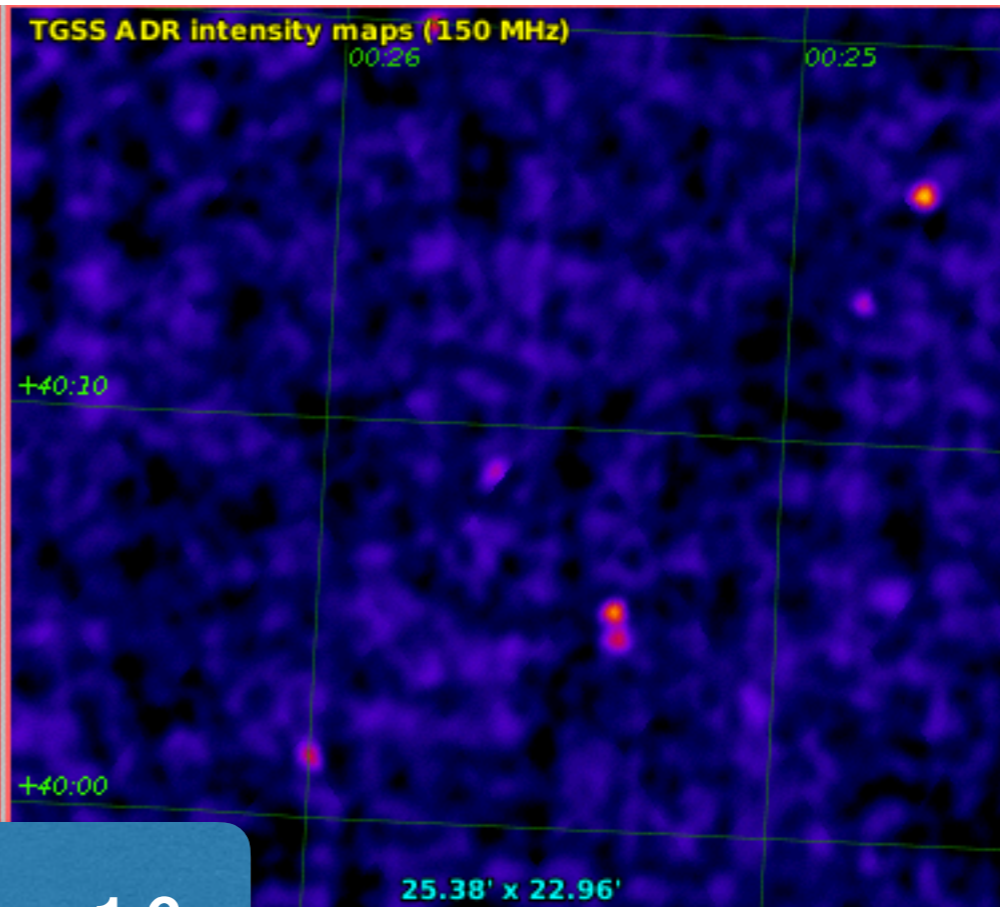
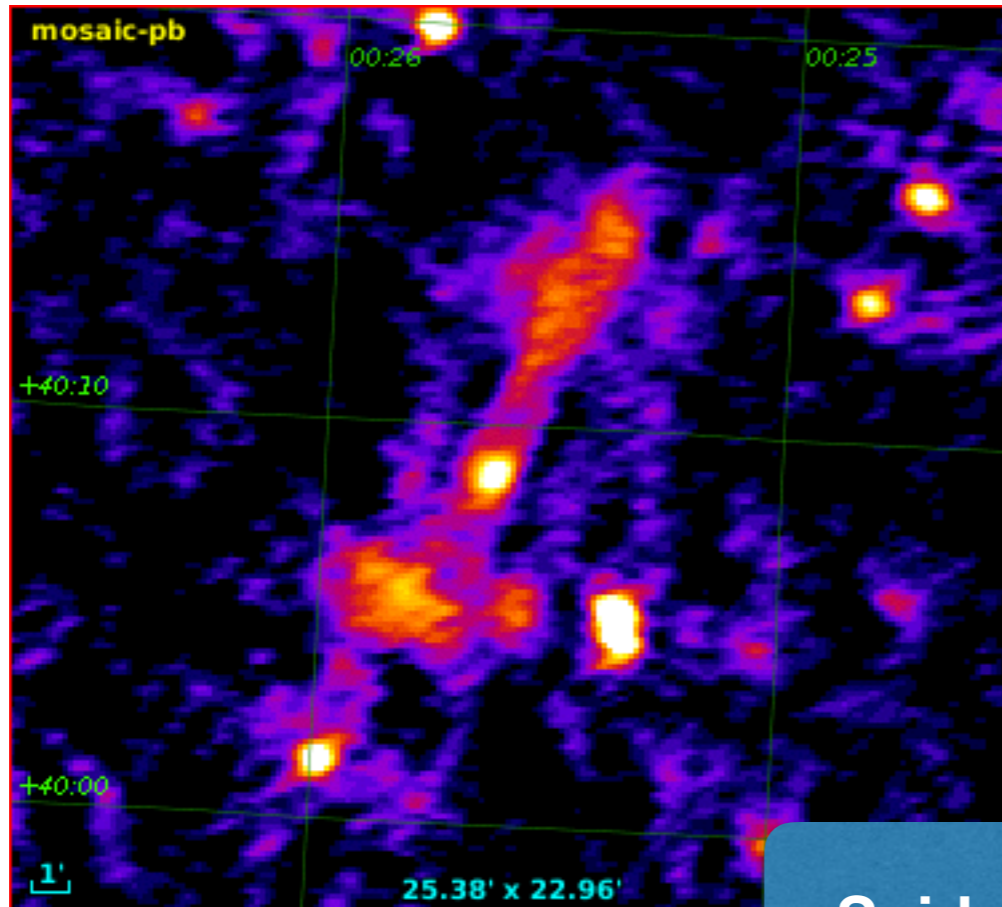


from ~500,000 radio spectra TGSS-NVSS



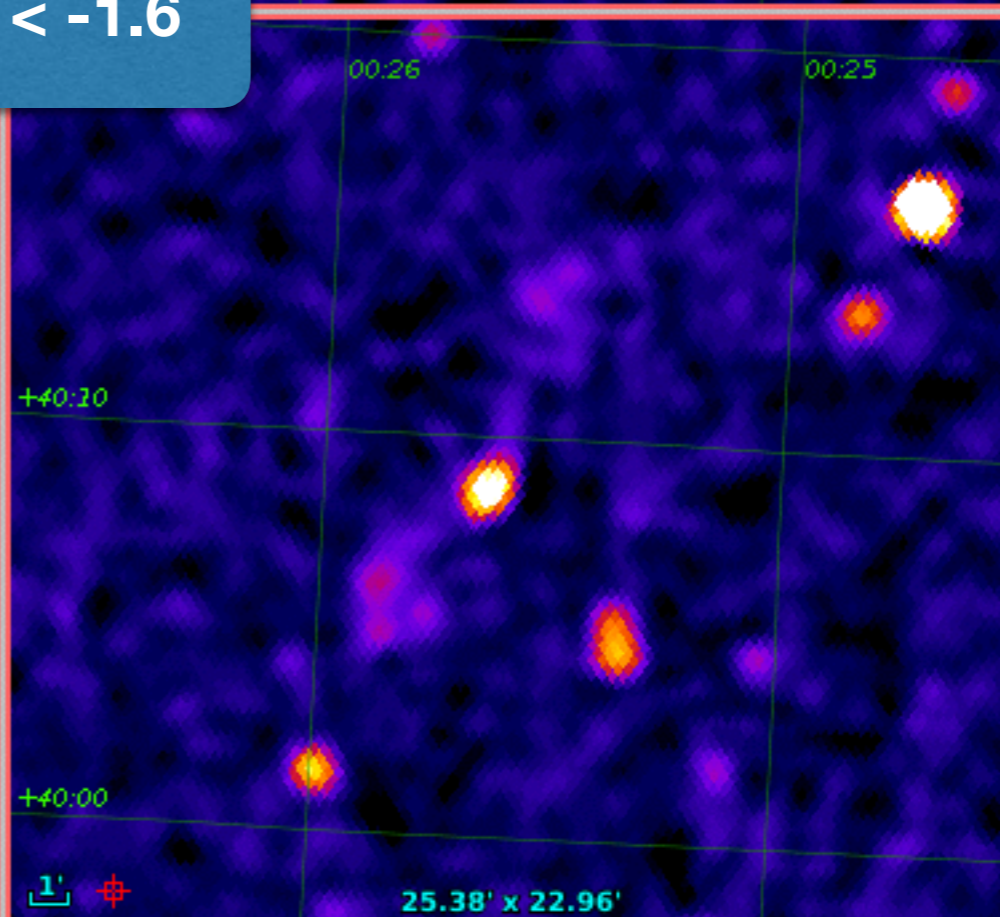
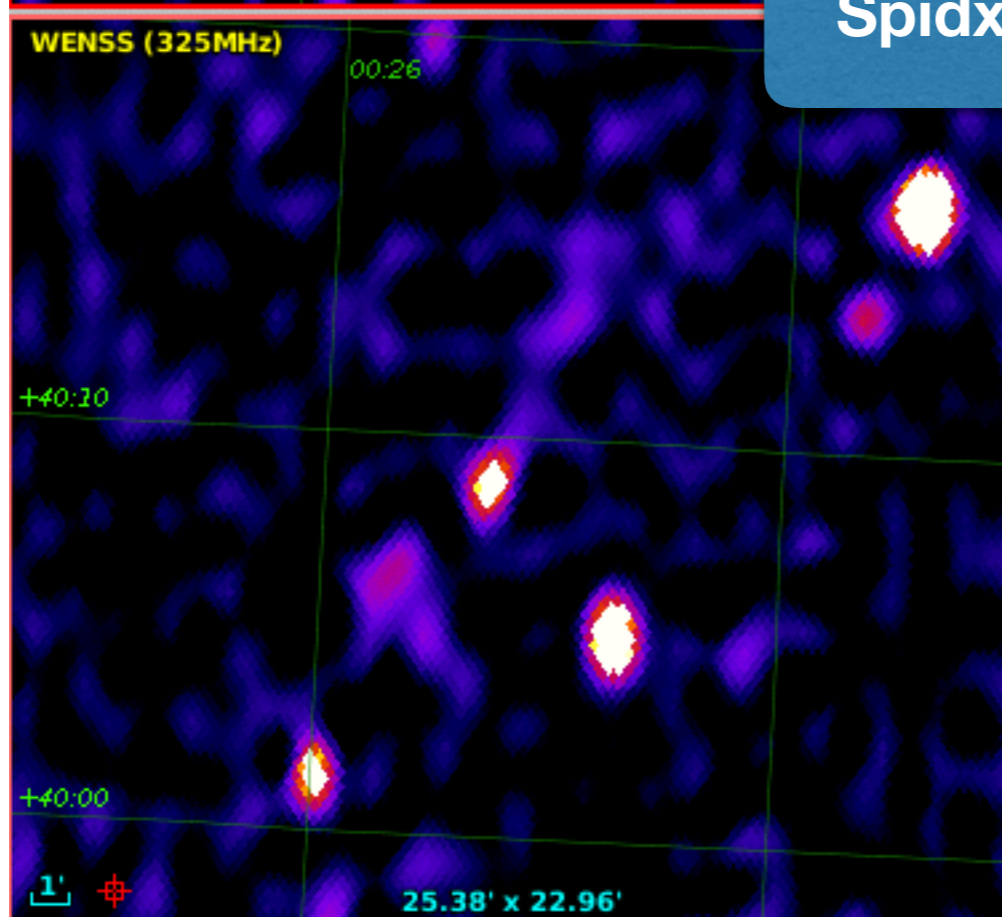
Faint sources have flatter spectrum.

LoLSS



TGSS

Spidx < -1.6

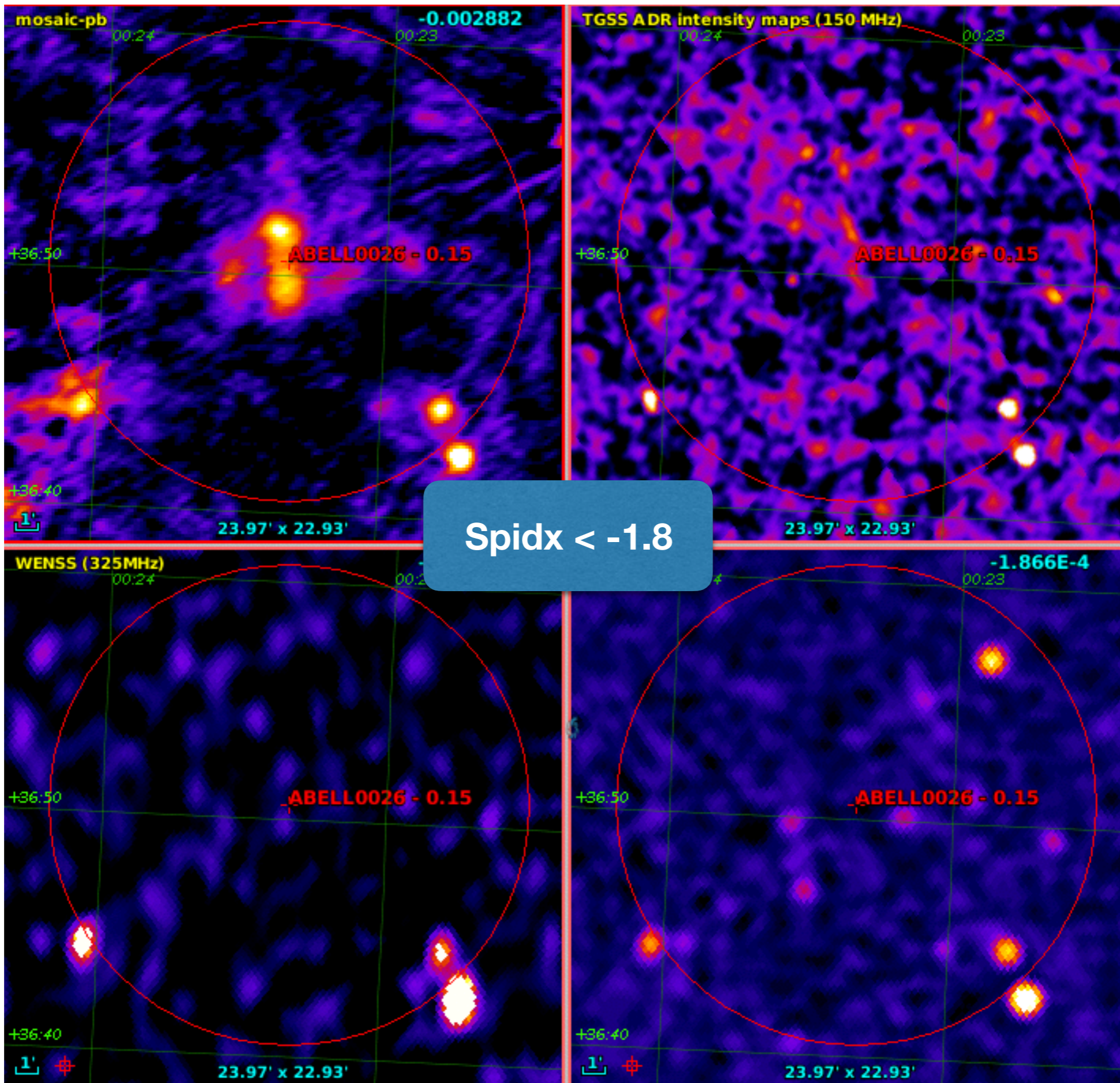


NVSS

WENSS

LoLss

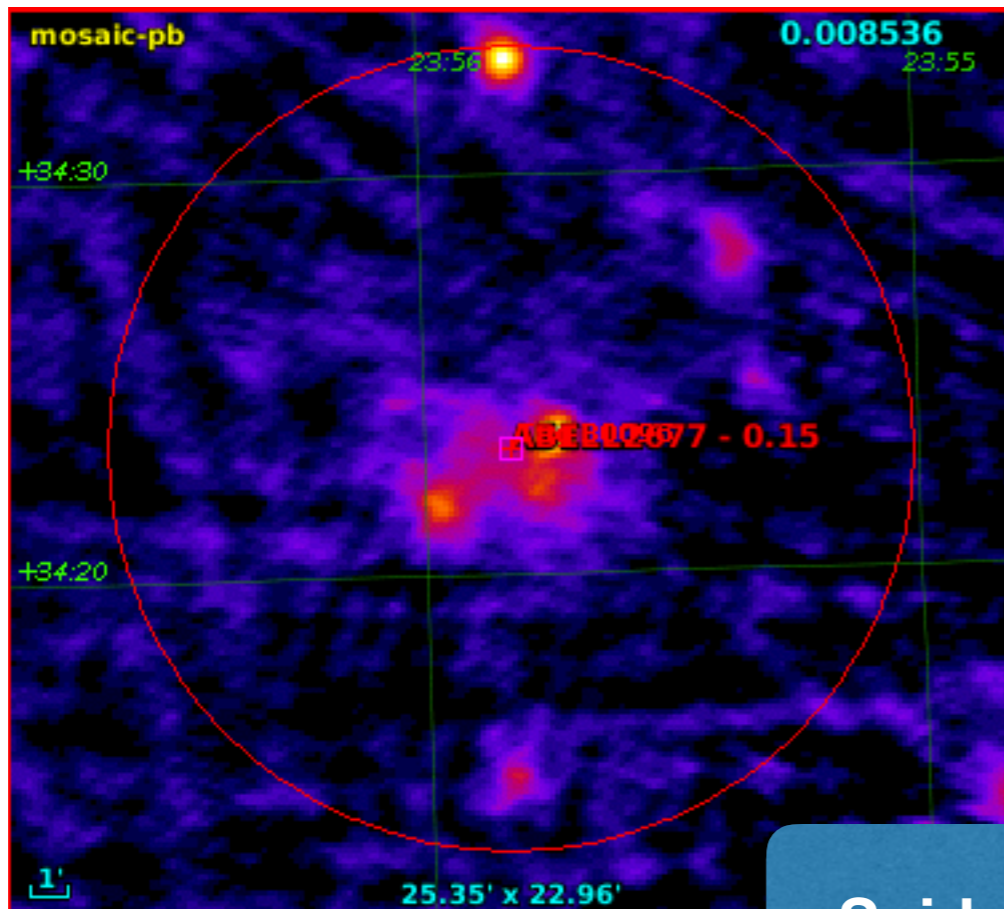
TGSS



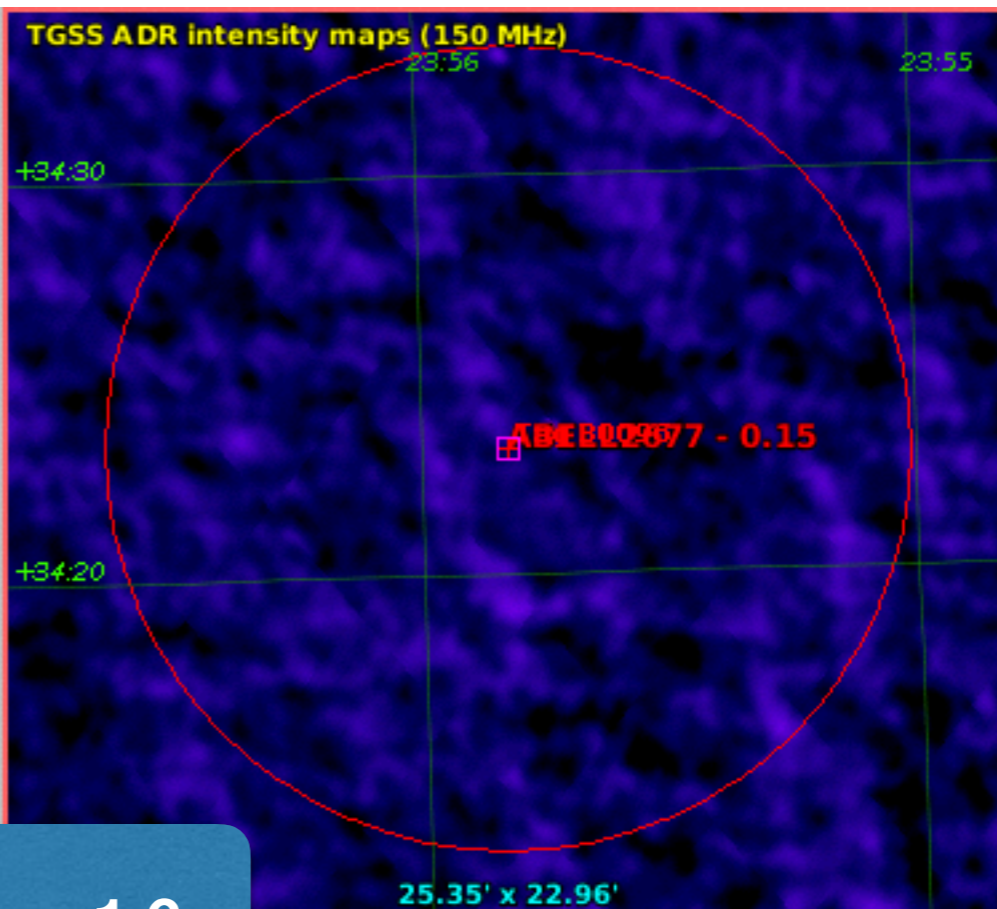
WENSS

NVSS

LoLSS

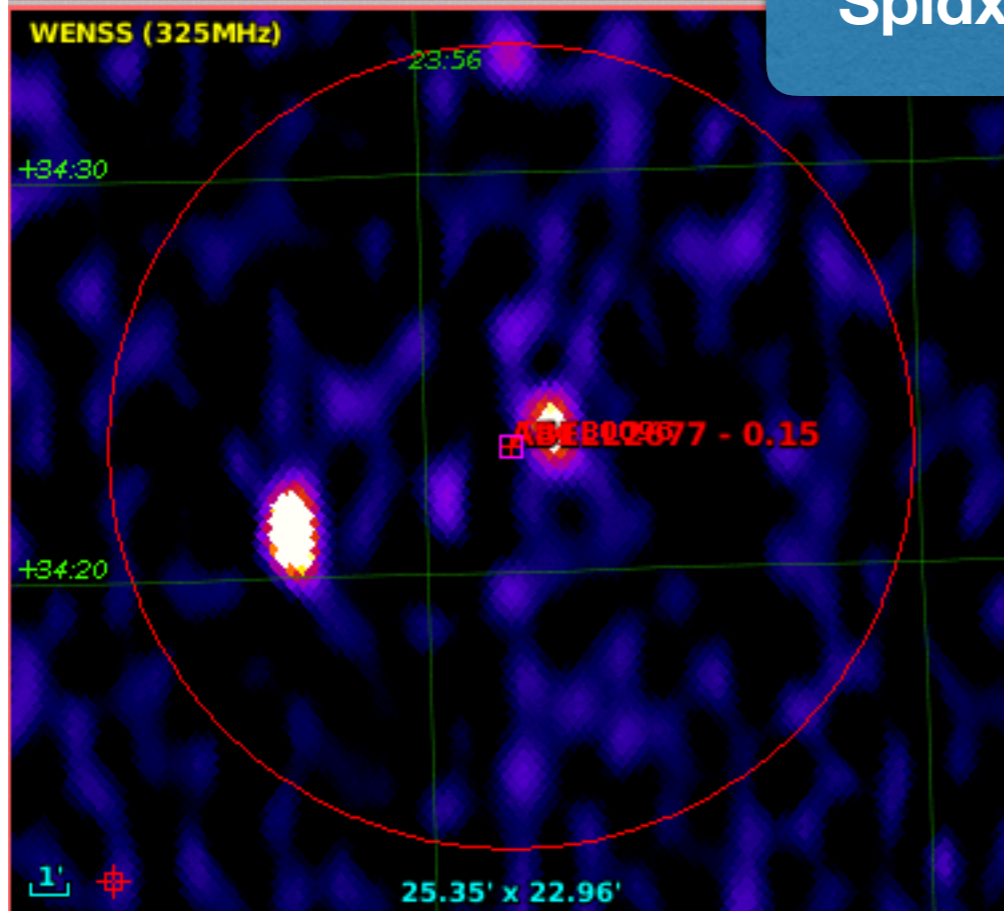


TGSS

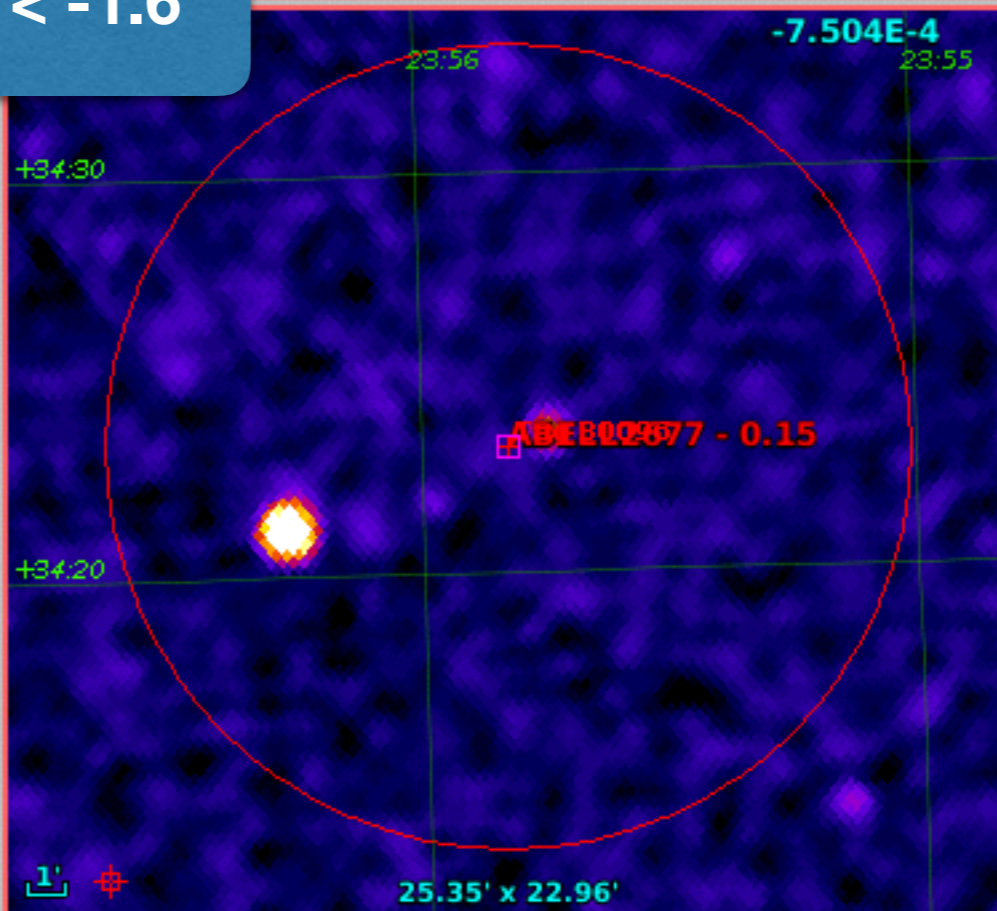


Spidx < -1.6

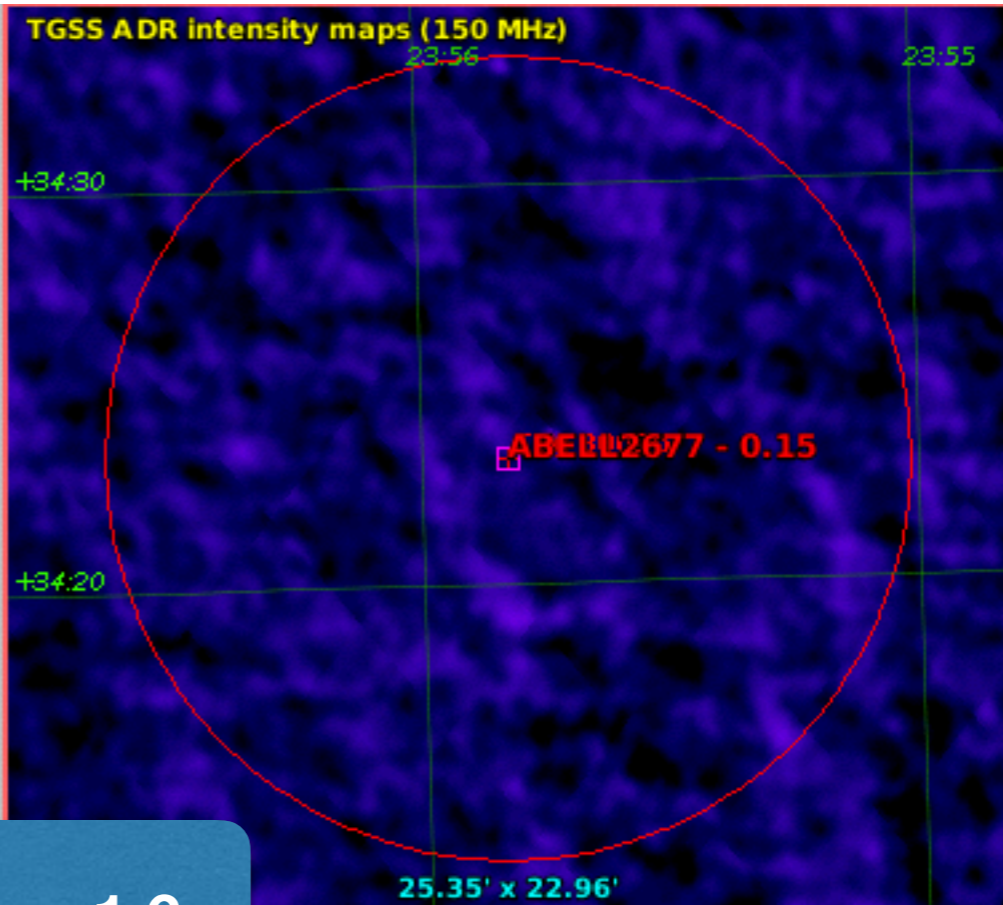
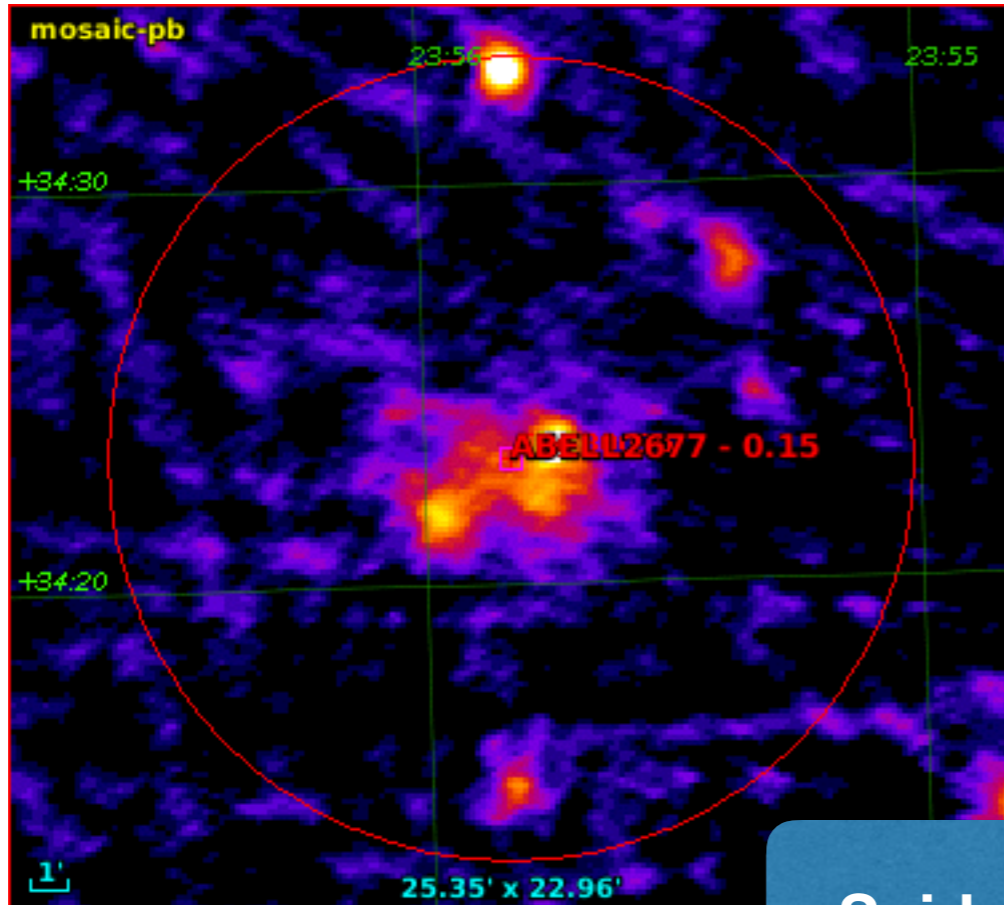
WENSS



NVSS

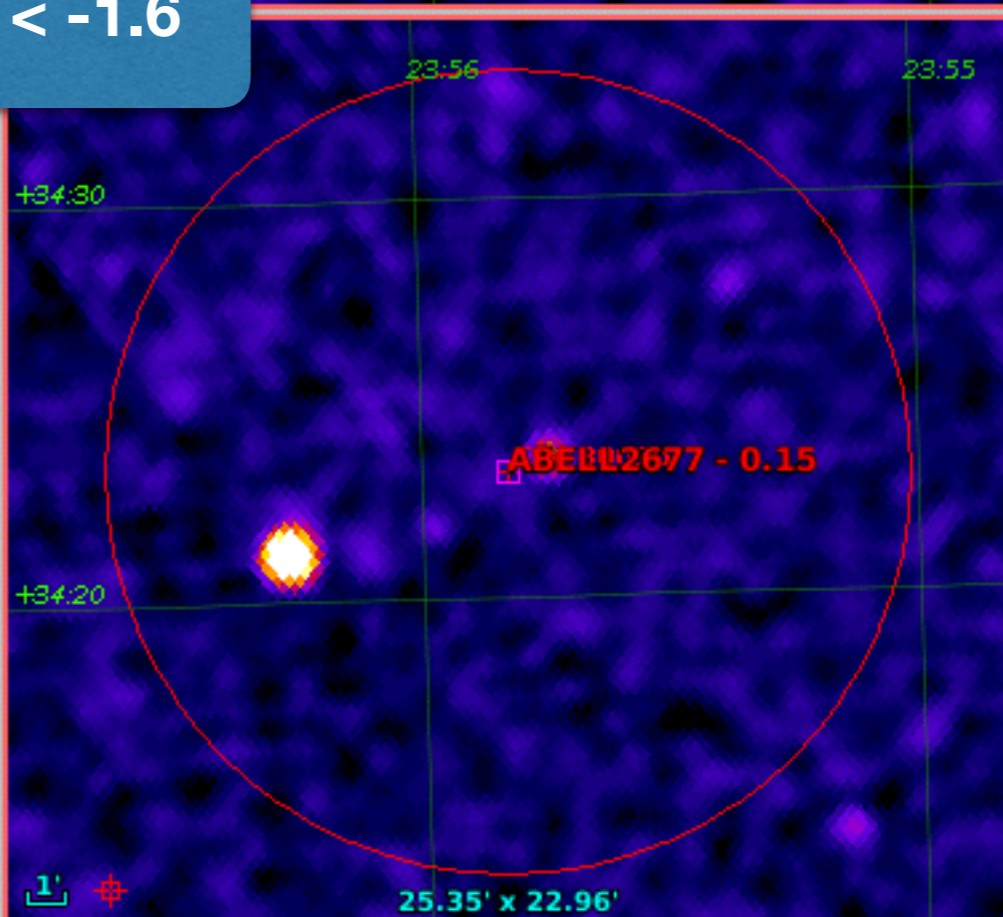
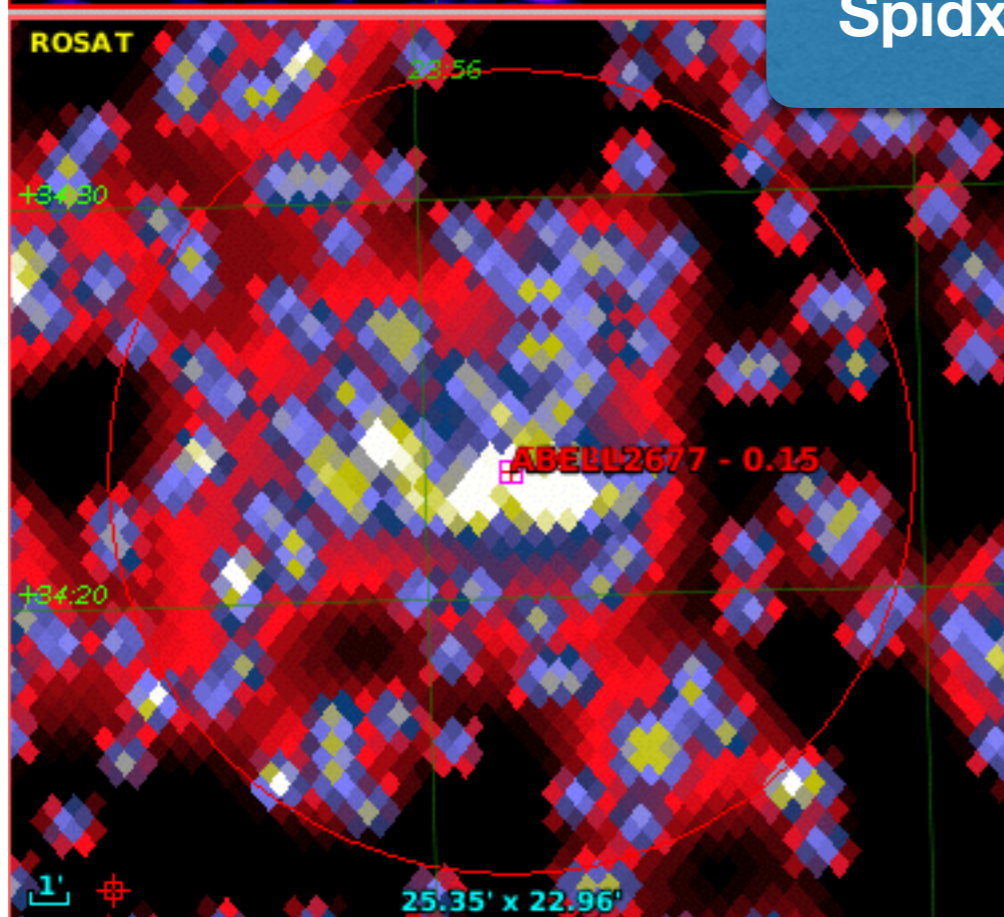


LoLSS



TGSS

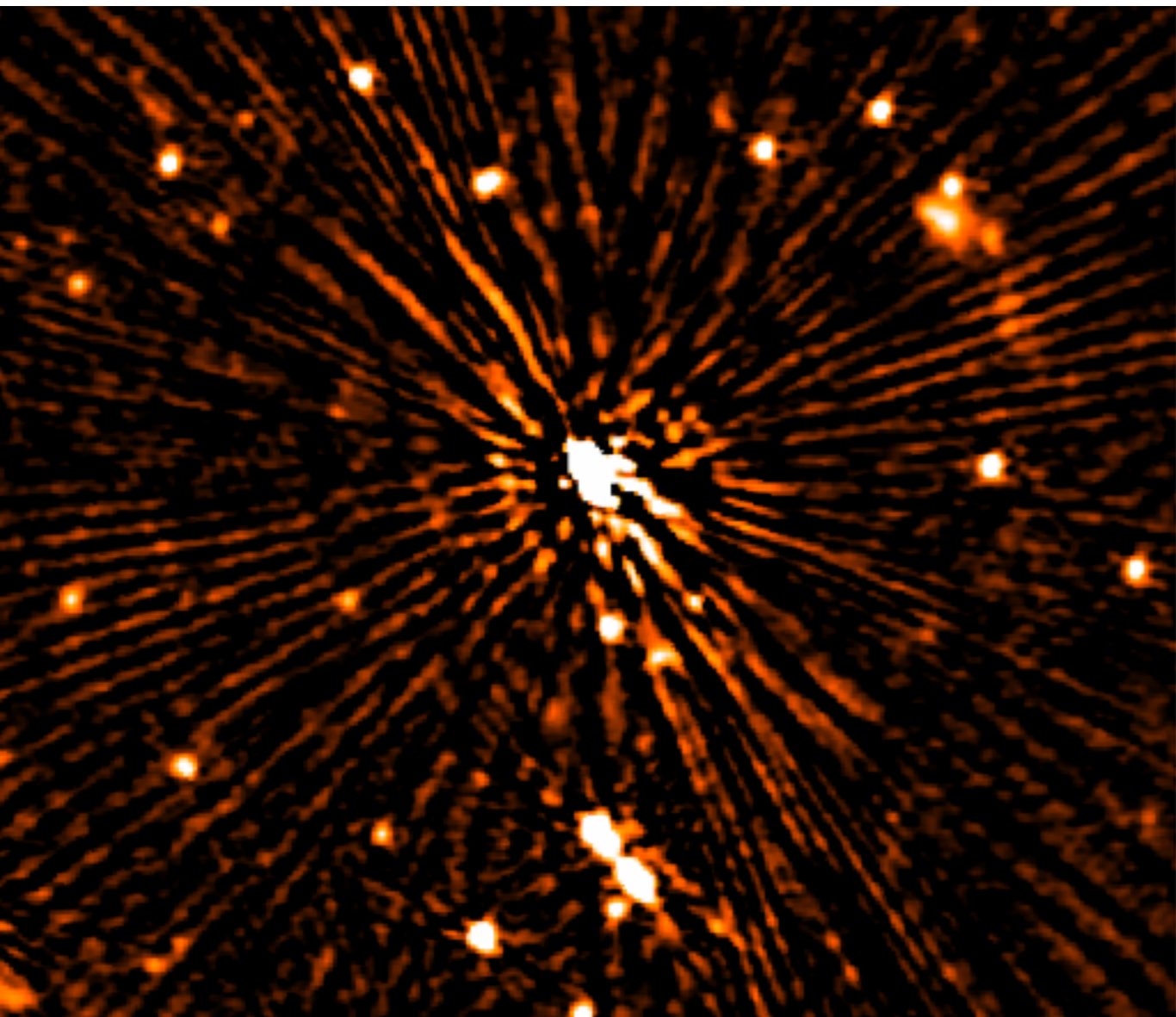
Spidx < -1.6



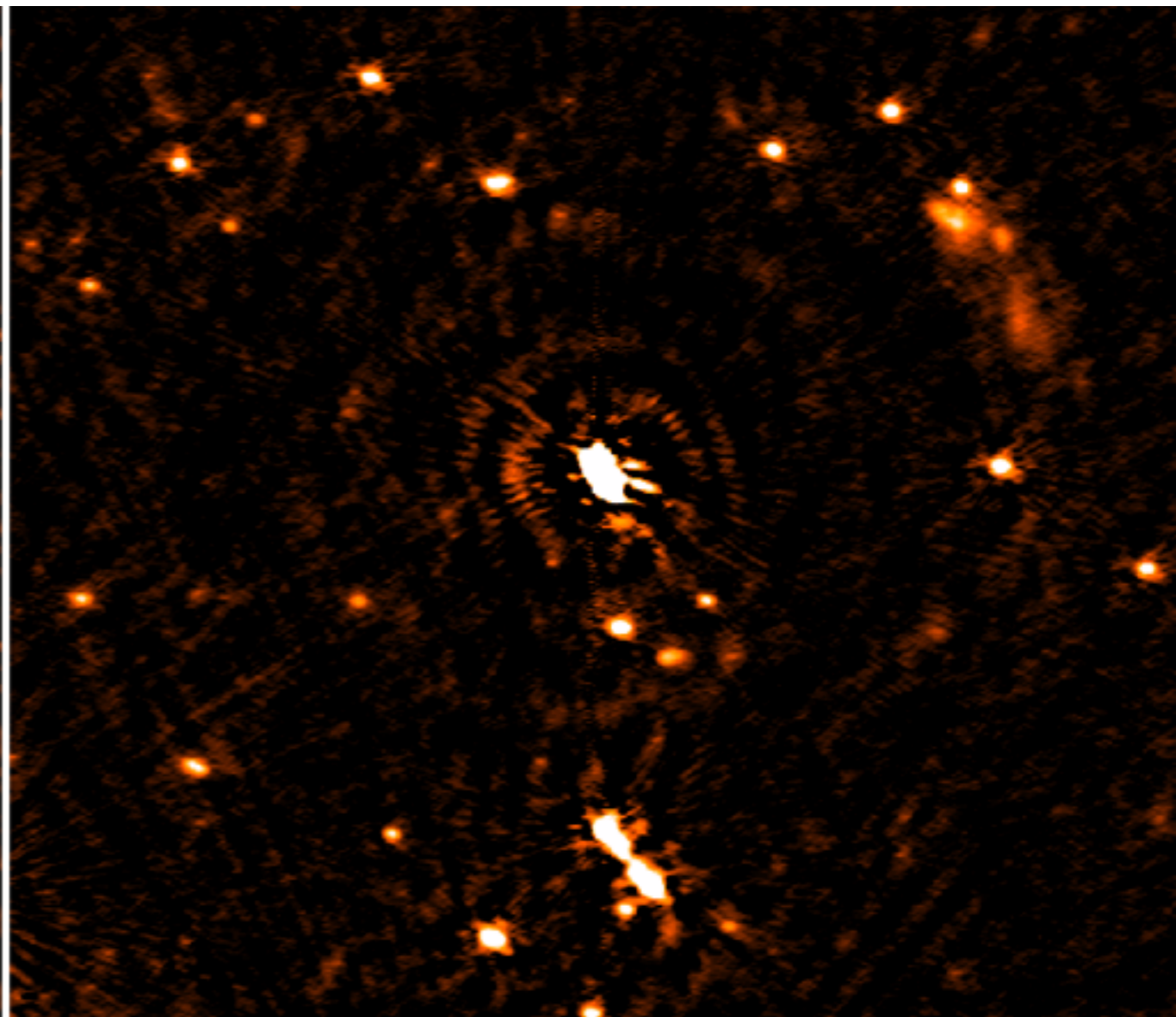
NVSS

ROSAT

Moving forward

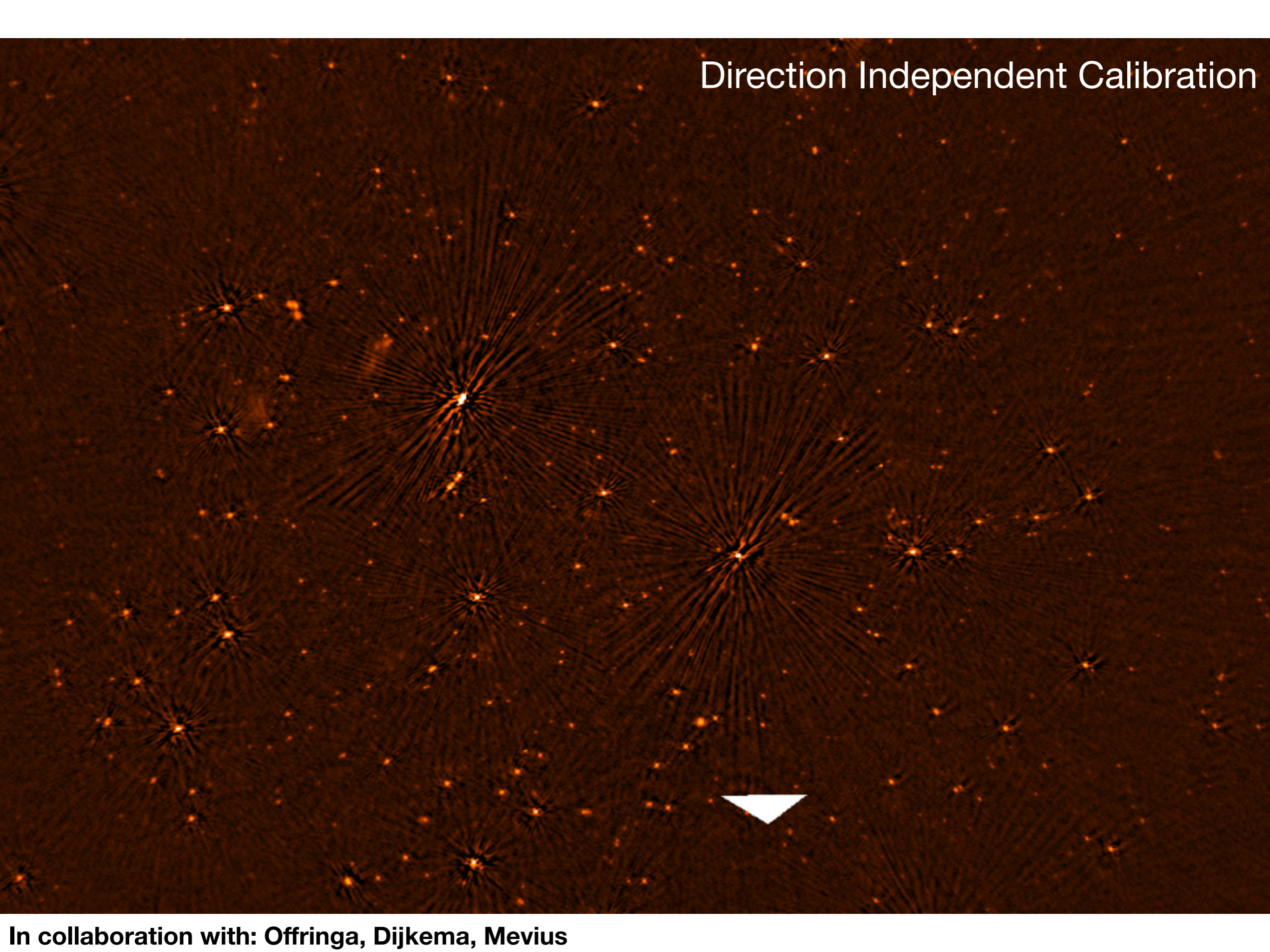


DIE calibration

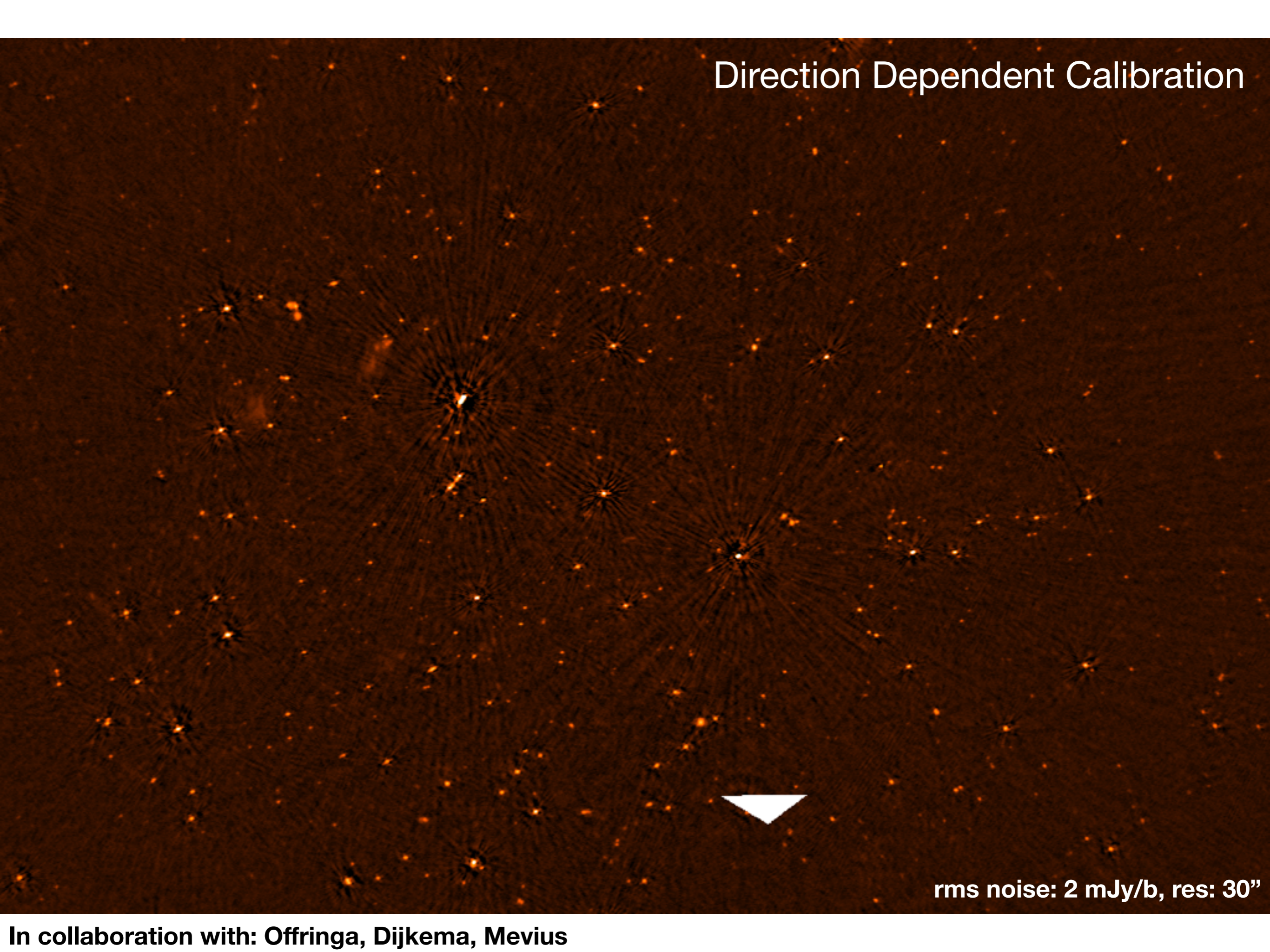


peeling-based calibration

Direction Independent Calibration

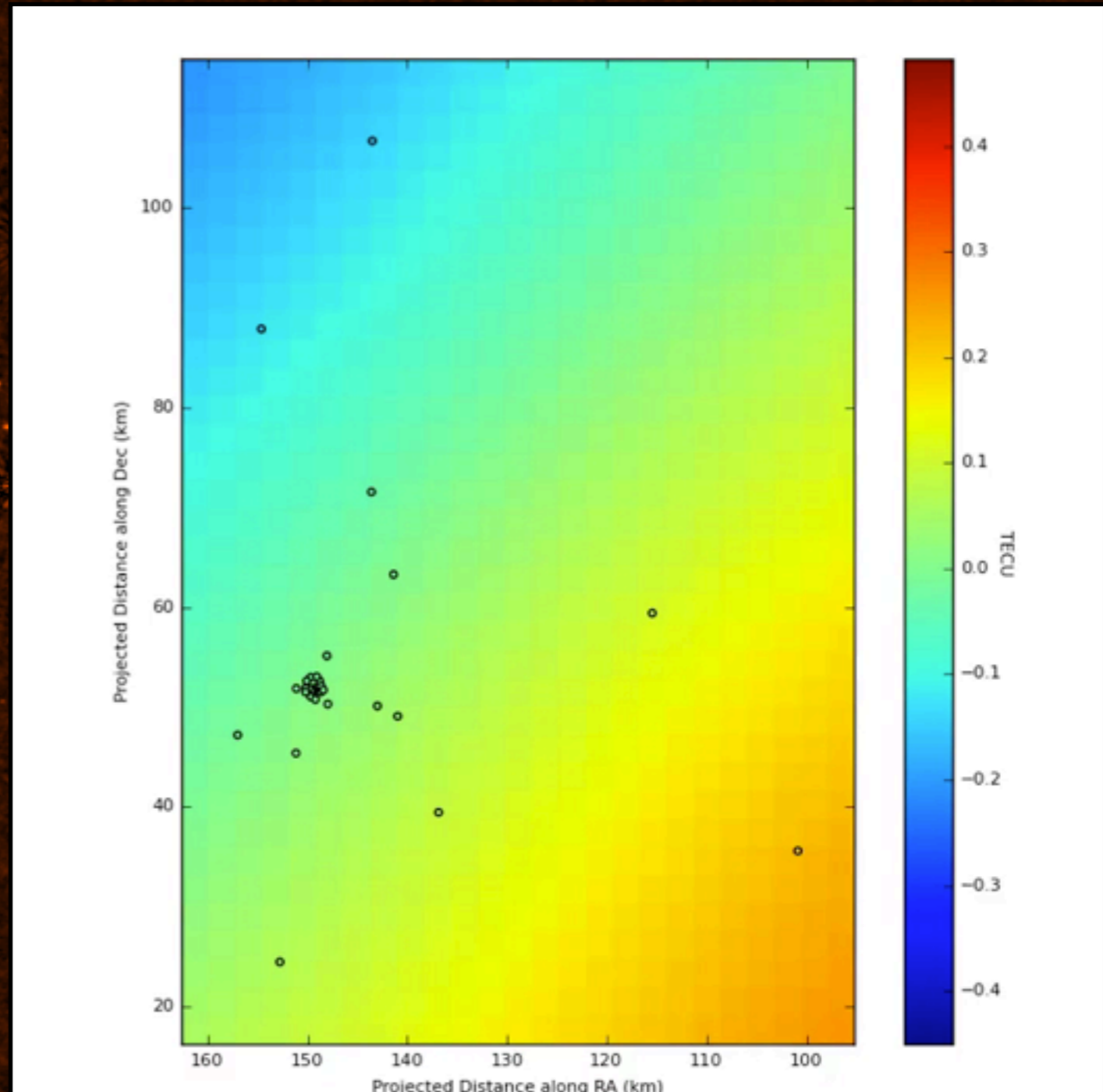


Direction Dependent Calibration



rms noise: 2 mJy/b, res: 30''

Direction Dependent Calibration



rms noise: 2 mJy/b, res: 30''

Conclusions

- First 8-pointing mosaic of LoLss
 - Coverage: 80 sqdeg
 - Sources: 2692
 - Rms noise: 3-6 mJy/b
 - Resolution: ~45"
 - Astrometric accuracy 3-4"
 - Flux consistent with archival data
- Confirm spectral index-flux density relation (faint sources are flatter)
- Detected 2 large/dead AGNs + 1 possible USS halo
- Next steps: direction dependent

