ASTRON

Netherlands Institute for Radio Astronomy

# LOFAR MSSS

## *Multifrequency Snapshot Sky Survey*

M*S*S*S

STATUS REPORT AND UPDATE

MULTIFREQUENCY SNAPSHOT SKY SURVEY

George Heald (MSSS Project Leader)
(on behalf of the MSSS Team)

LSM, 26/11/2014

ASTRON is part of the Netherlands Organisation for Scientific Research (NWO)

LOFAR

$$S'(\nu) = \frac{S_{\mathrm{t,SW}}(\nu)/S_{\mathrm{t,SY}}(\nu)}{S_{\mathrm{c,SW}}(\nu)/S_{\mathrm{c,SY}}(\nu)}$$

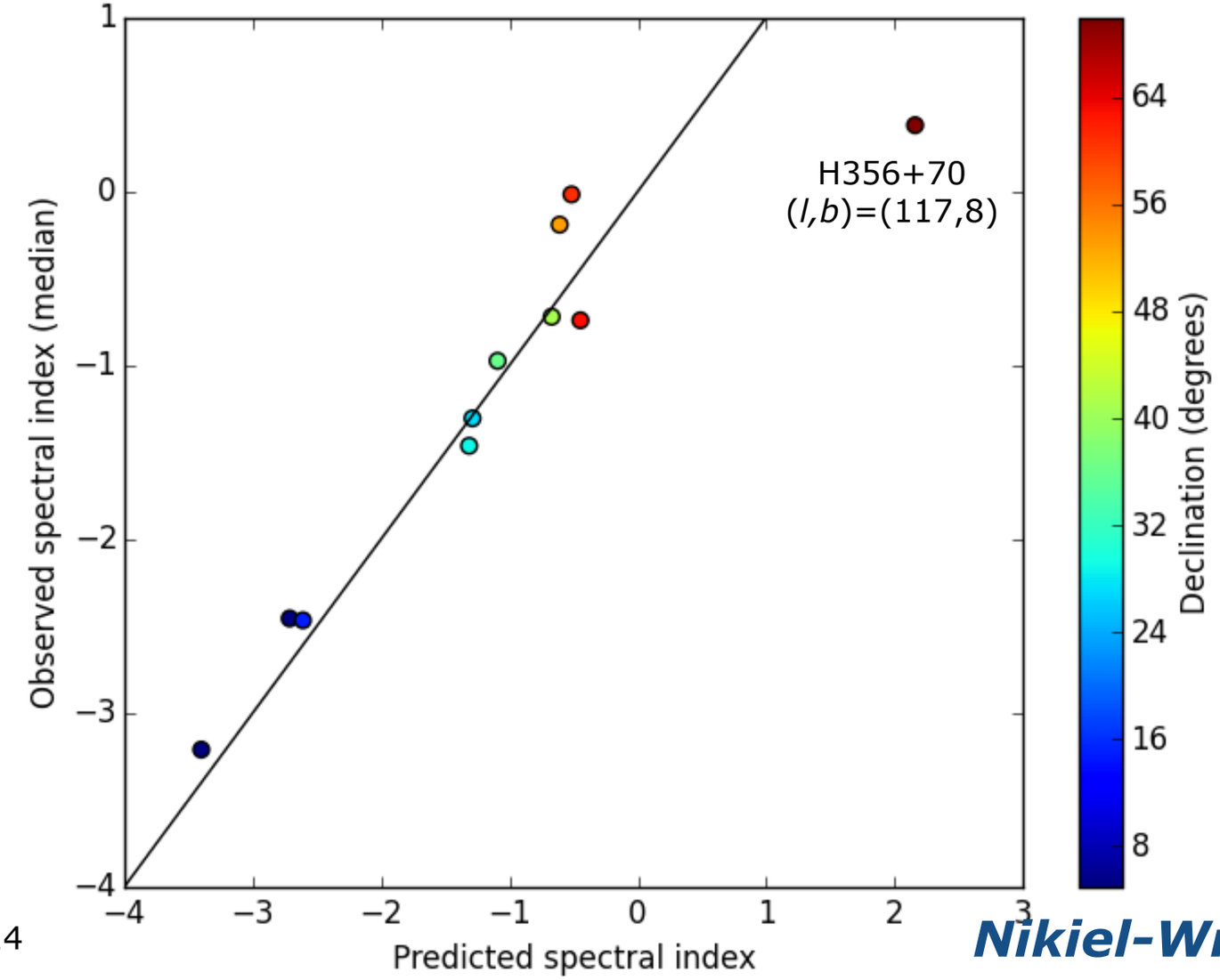
$$S \equiv |E_{00}E_{00}^*| + |E_{11}E_{11}^*|$$

−1.6 −0.8 0.0 0.8 1.6 2.4 3.2 4.0

Effective spectral index (modeled), assuming 0.8 intrinsic

# Additional tests

- See LSM presentation from 1 Oct 2014
- Using generalized script to estimate effect in arbitrary observation:
  CEP2: /home/heald/snu/senscorr.py  (use with suspicion!)
- Based on EM models by Wijnholds, Arts, & Kant
- In principle can be used to adjust fluxes in flux corrected images






Nikiel-Wroczyński

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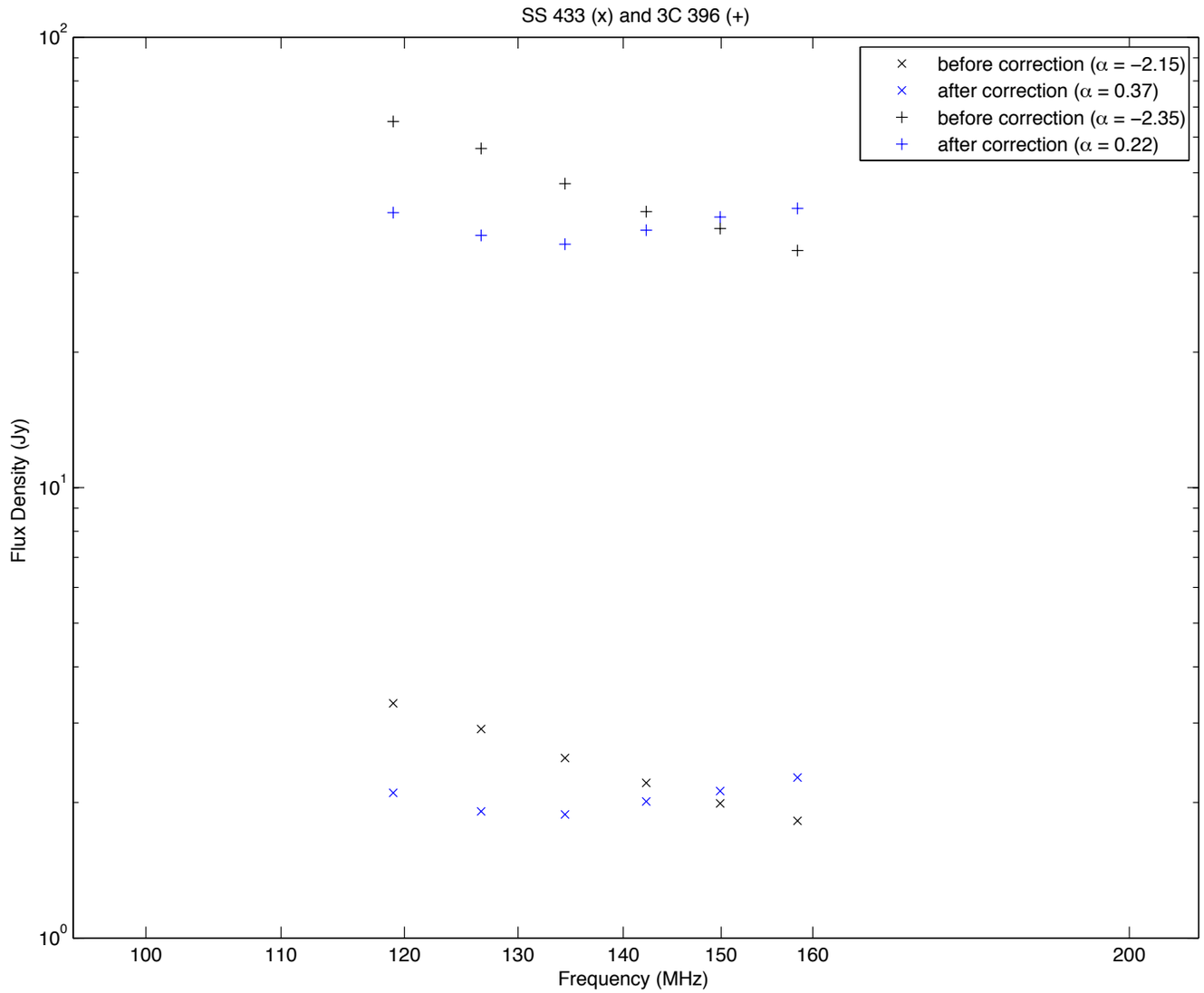



Broderick

# Beam normalization: next steps

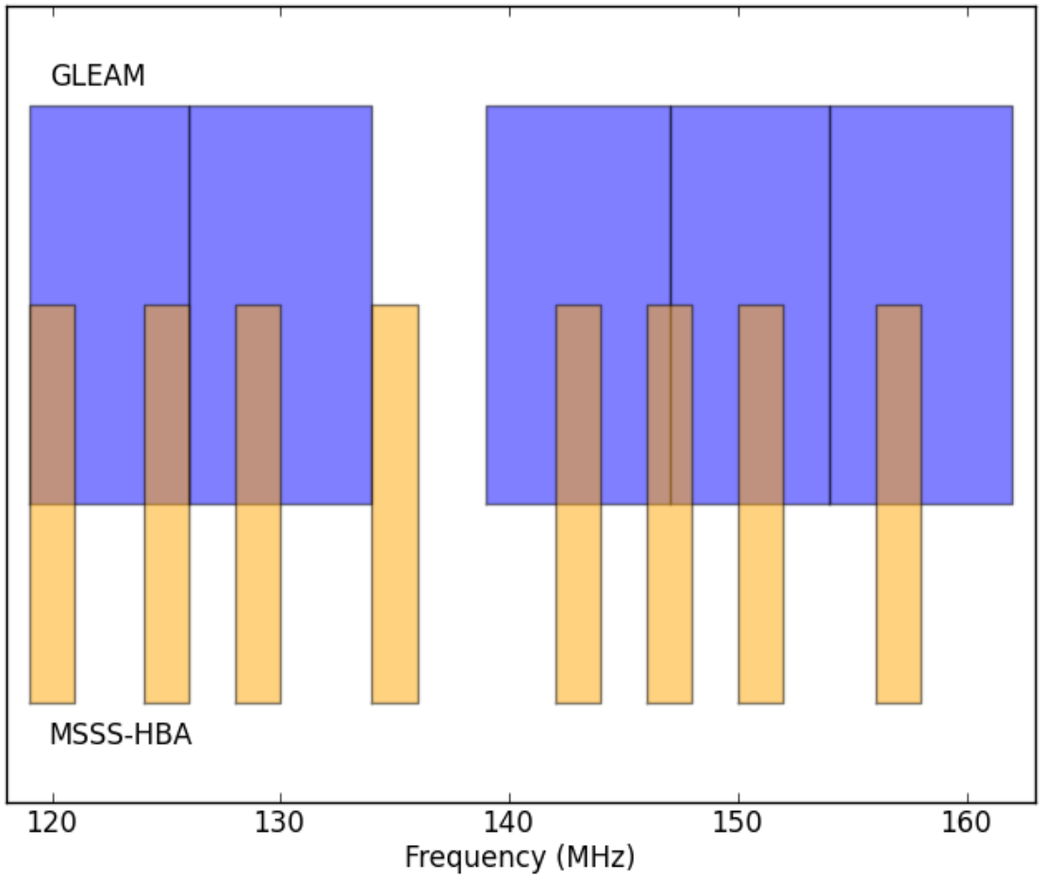
- Next step is to check quality of “simple” correction applying normalization from reference pointing (zenith)
- Can be checked with MSSS soon, and applied in code that uses beam model with a relatively straightforward procedure (being specified in discussion with Tammo Jan Dijkema)
- Later: implementation of full EM modeling (longer timescale)

# Comparing MSSS & GLEAM

| | Full Instrument |
|---|---|
| Number of 16-dipole tiles | 128 |
| Number of receivers | 16 |
| Observing frequencies | 75—220 MHz |
| Frequency resolution | 40 kHz |
| Longest baseline | 2800m |
| Angular resolution | 4'—1.2' |
| Polarisation | I, Q, U, V |
| Primary beam FHWM | 25º—10º |
| Confusion limit/mJy | 60mJy—5mJy |

# Comparing MSSS and GLEAM

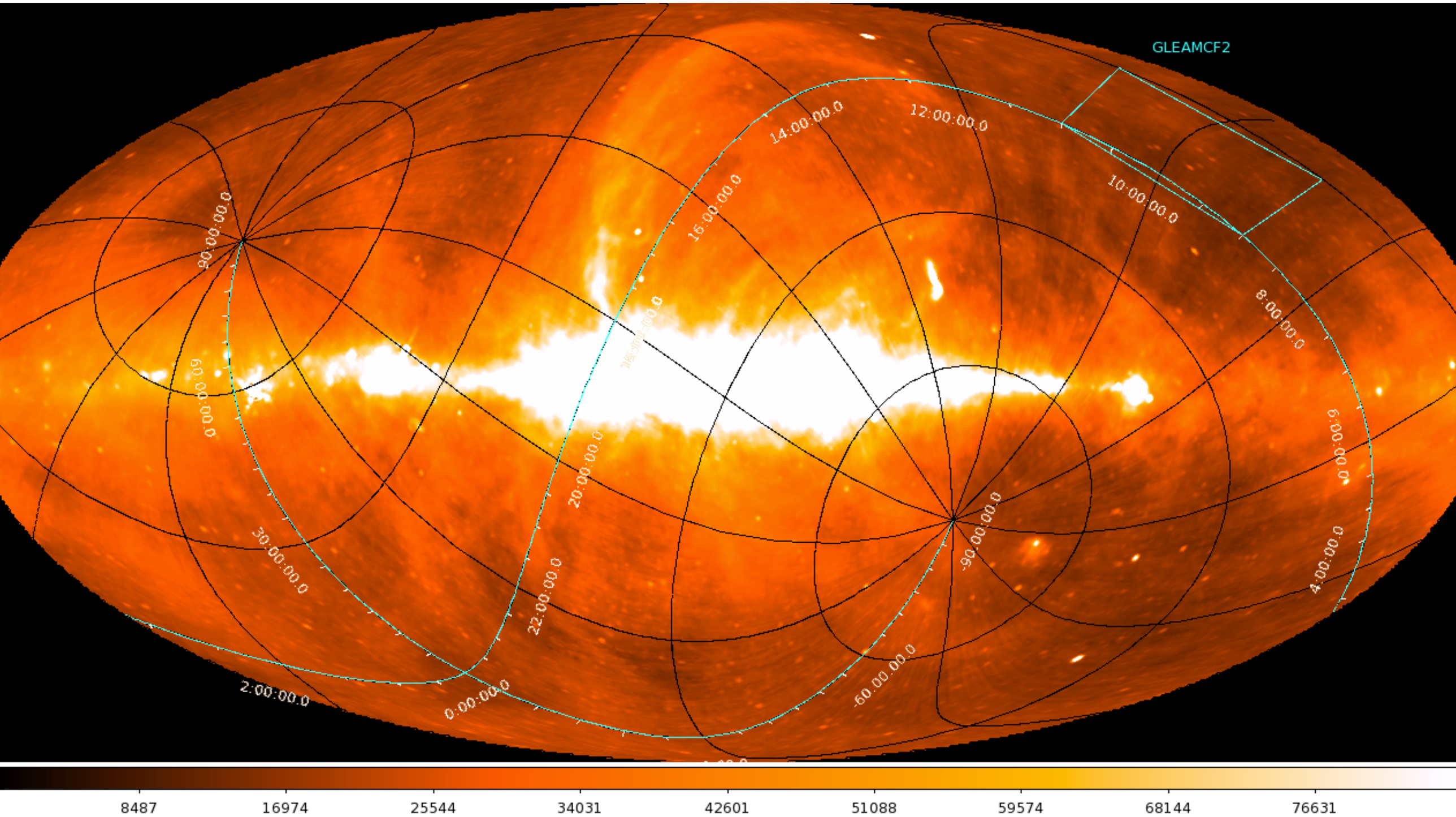
- Substantial overlap in frequency (subset with overlap shown)




- Compatible beam size, (confusion) noise level
- Large overlap in declination coverage (GLEAM goes up to +30°, MSSS down to 0°)
- Both have systematics to address, but they are different (and often orthogonal!)

# Comparing MSSS and GLEAM

- Region picked between RA=9-11h, Dec=0-30d

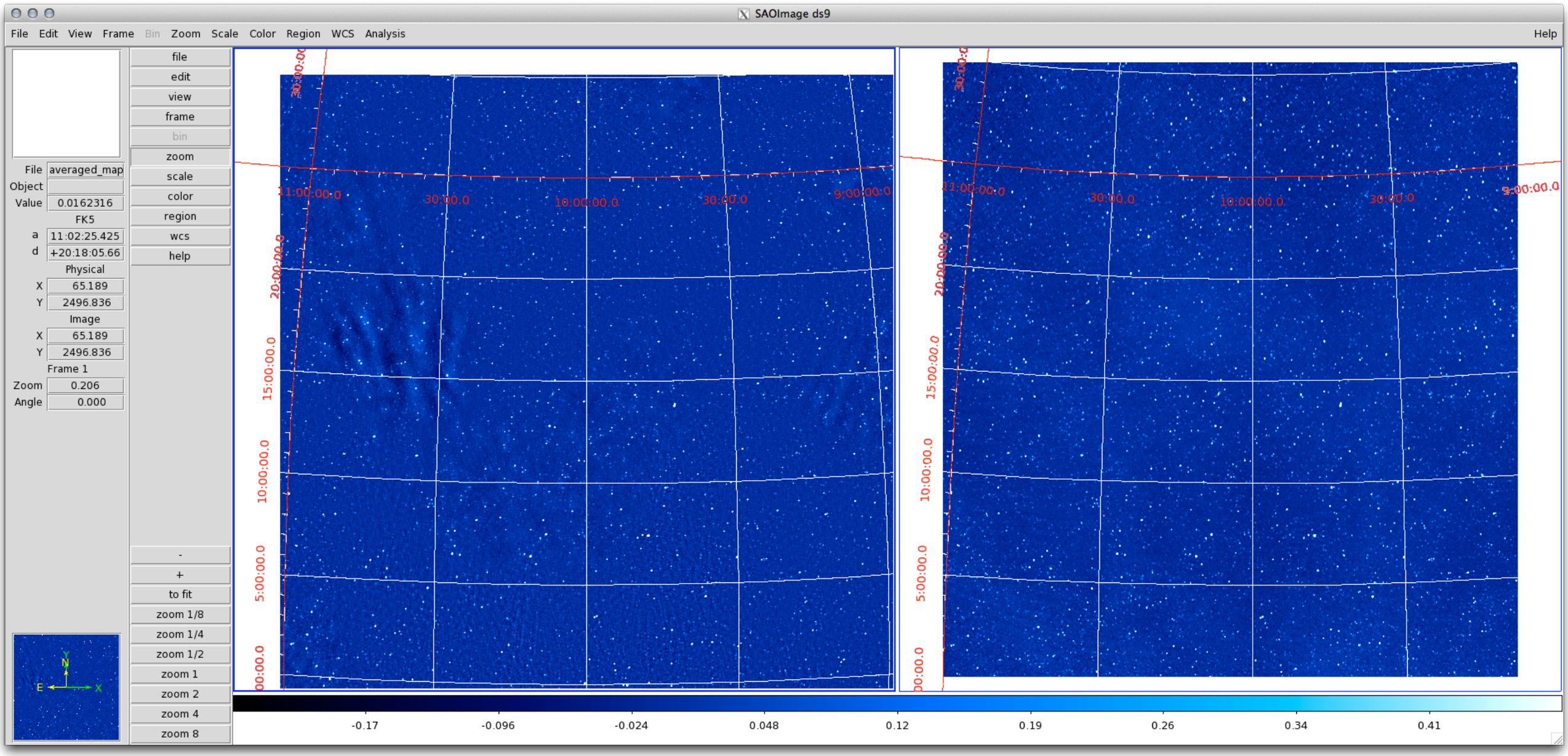



Colormap: Haslam 408 MHz

# Comparing MSSS and GLEAM

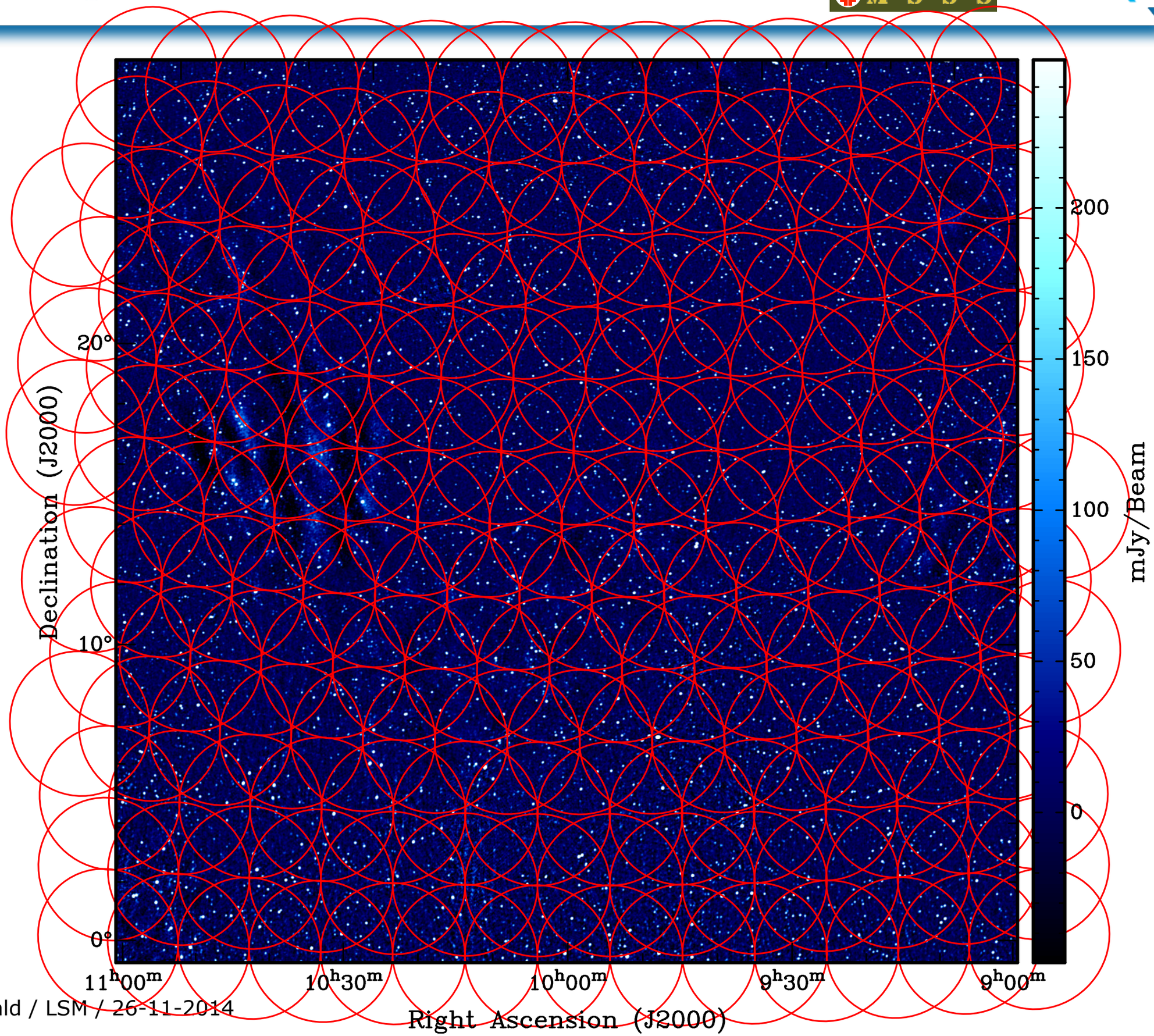
- Ongoing comparison between MSSS and GLEAM

  ***GLEAM image courtesy Natasha Hurley-Walker***

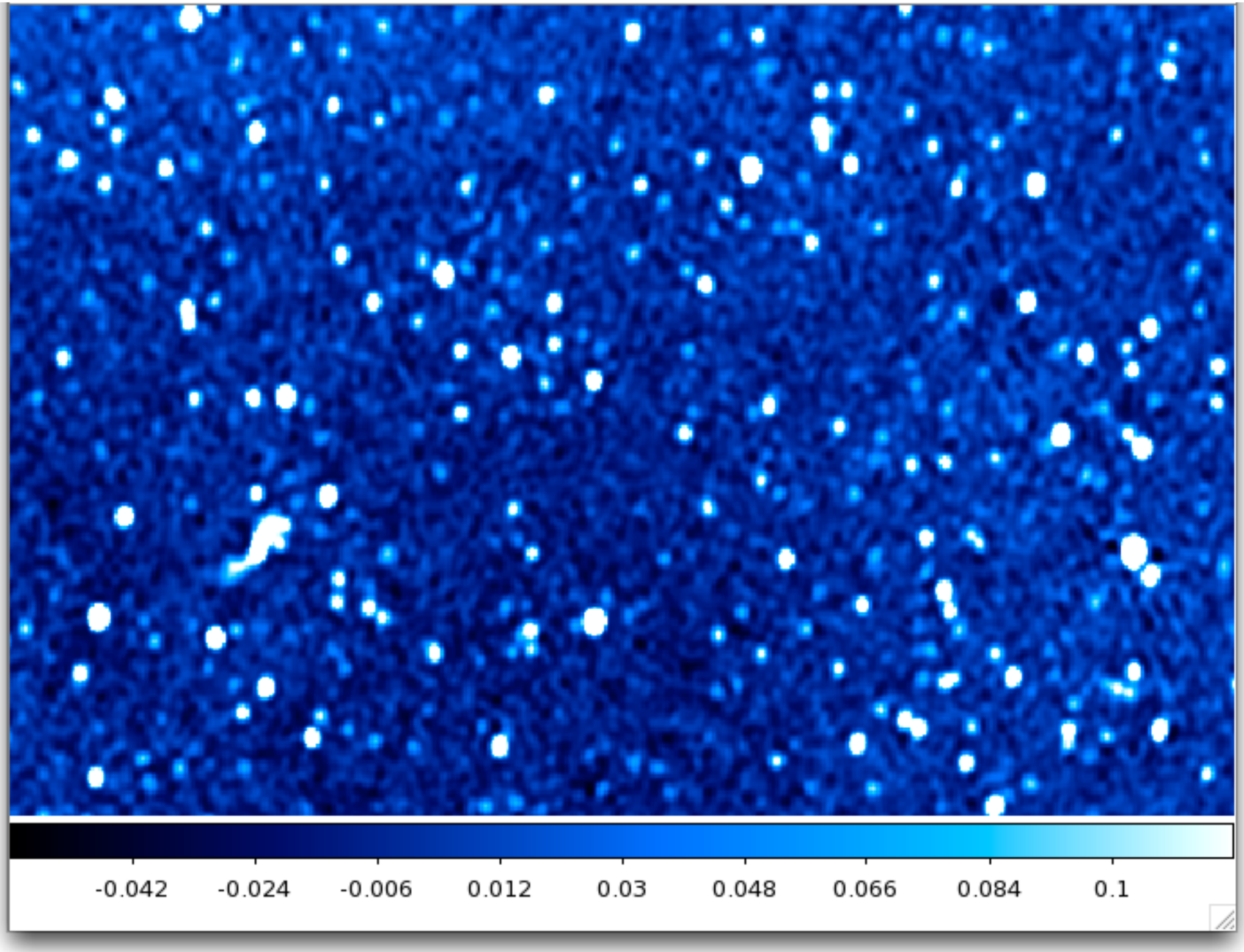



MSSS (v0) GLEAM

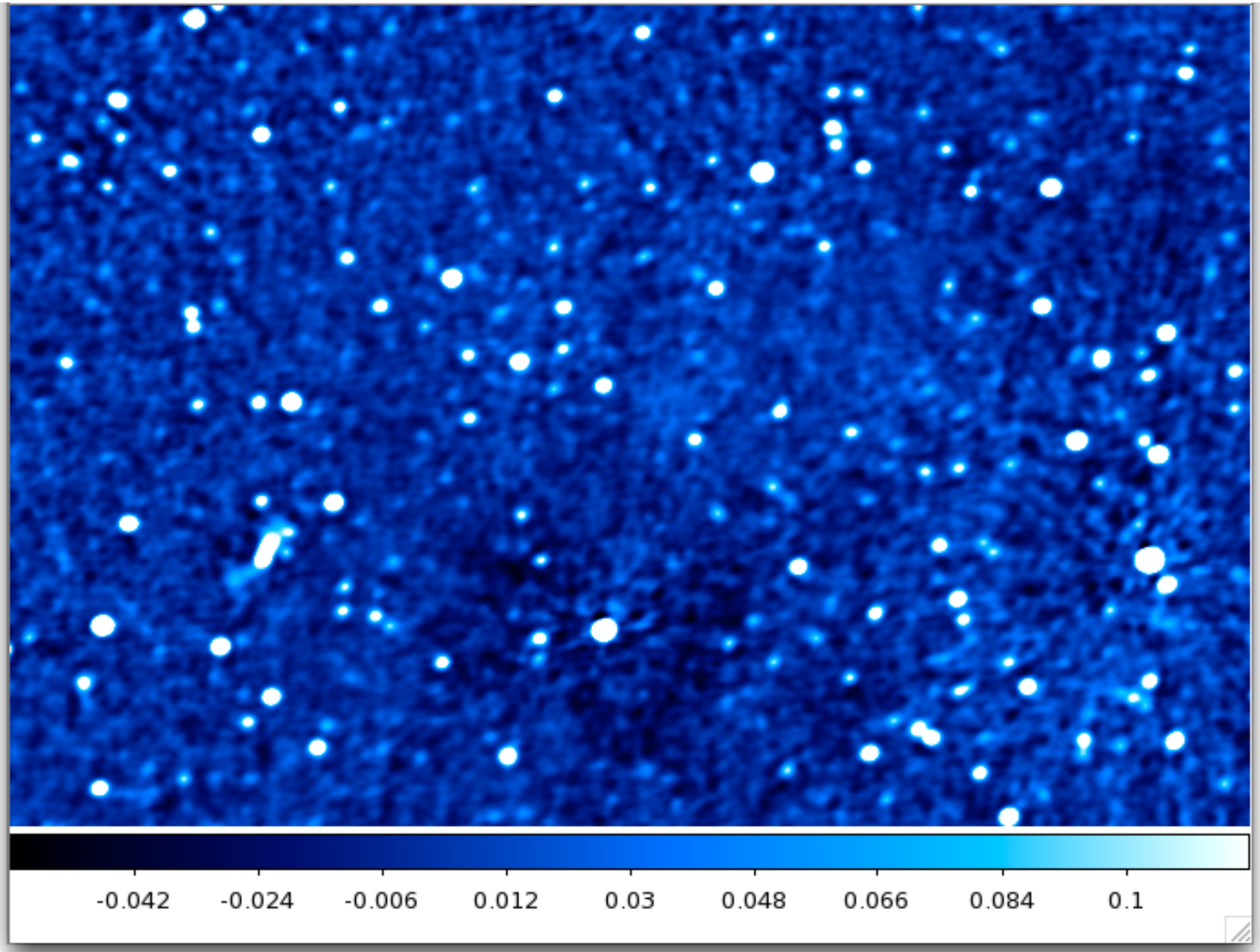
# Mosaicing MSSS



# Zoomin comparison - GLEAM



# Zoomin comparison - MSSS



# MSSS-GLEAM comparison highlights

- Dec-dependent flux scale mismatch, due to a combination of systematic effects in both surveys — ***USEFUL***
- Nothing notable in astrometric offsets (initial offsets now fixed)
- Intriguing common discrepancy wrt extrapolation from existing surveys (NVSS & VLSS)

- Ongoing work to be described in more detail later