

C-Band Continuum Galactic Plane Mapping

Nazar Budaiev

Overview

- **Introduction**
- GBT Diffuse Ionized Gas Survey (GDIGS)
- Data Processing
- What Science Can Be Done?
- Next Steps

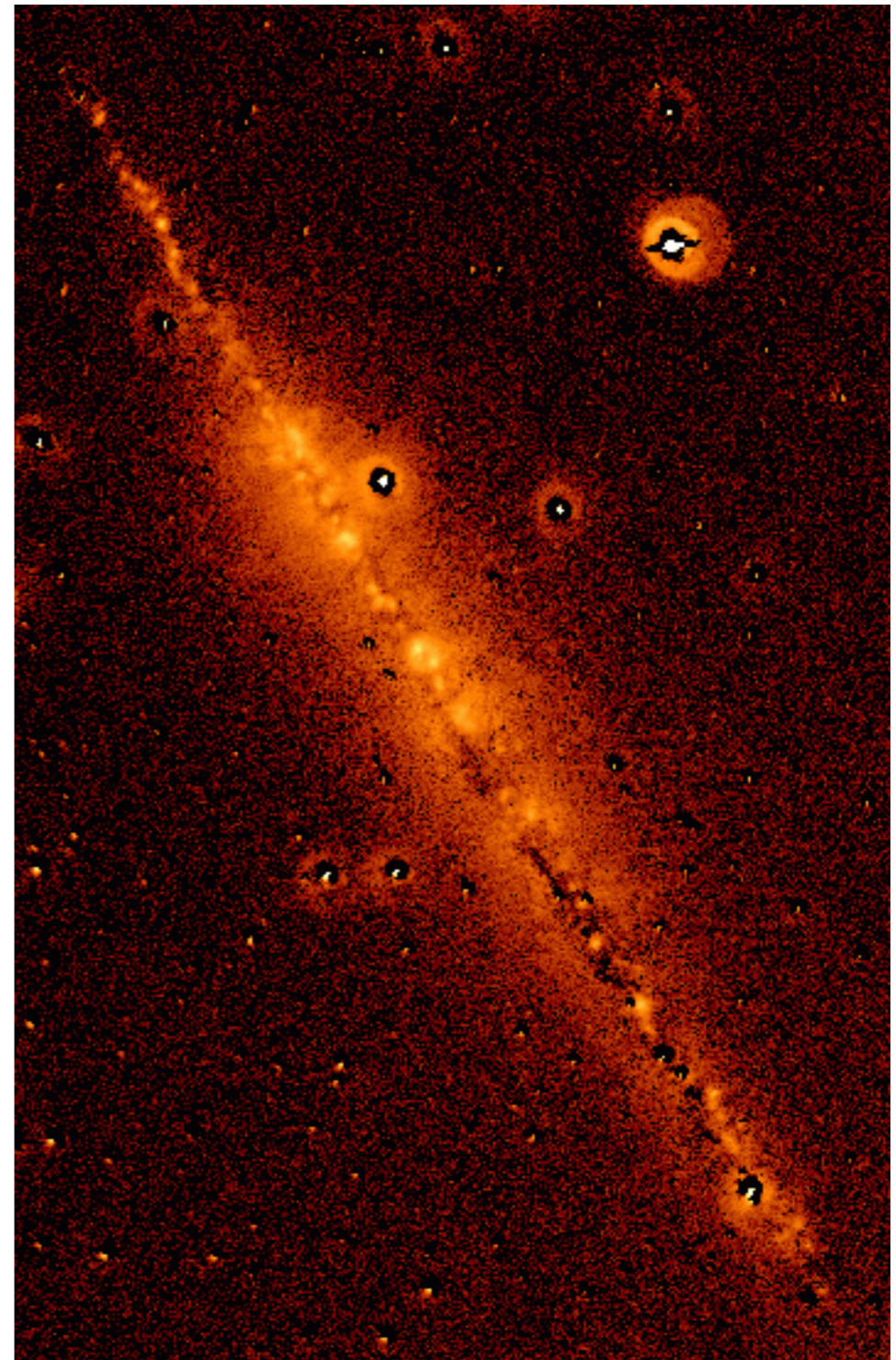
HII Regions

- Term first discussed in 1939 by B. Strömgren
- Observed in 17th century (Orion Nebula)
- $1 - 10^5$ per cm^3
- Leaking ionizing radiation



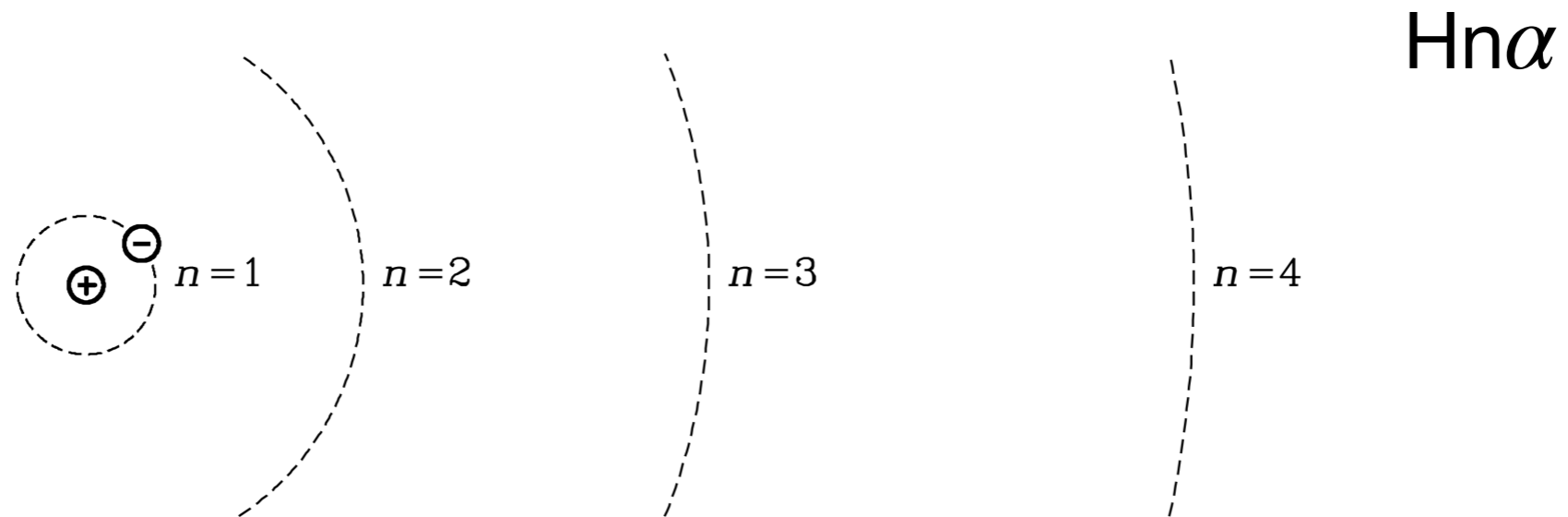
Warm Ionized Medium

- First described in 1962 by F. Hoyle and G. R. A. Ellis
- 10^4 K plasma
- <0.1 per cm^3
- 90% of ionized gas in the Milky Way Galaxy
- 20% of gas mass



Some Physics

Radio Recombination Lines



Previous surveys

HII

- CORNISH - VLA
- GPSR5 - VLA
- HRDS - GBT

WIM

- WHAM, SHASSA, VTSS
(H α)
- SIGGMA - Arecibo

Overview

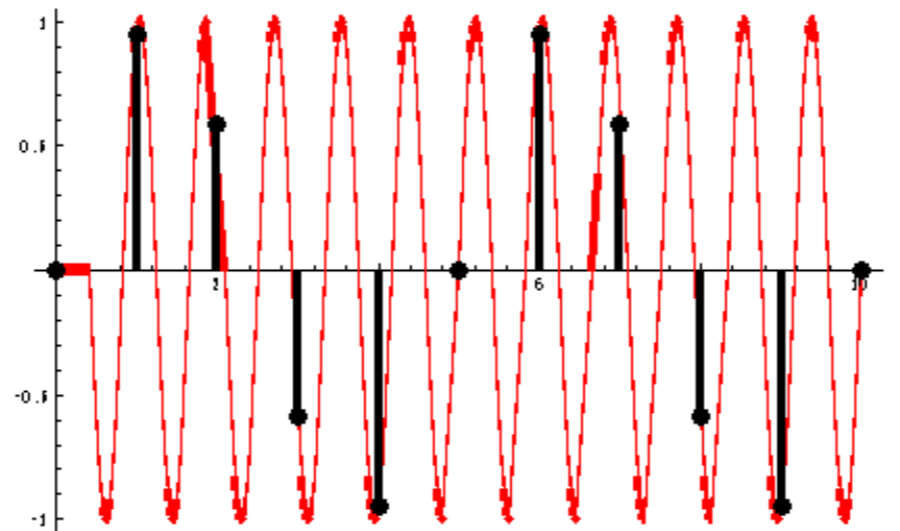
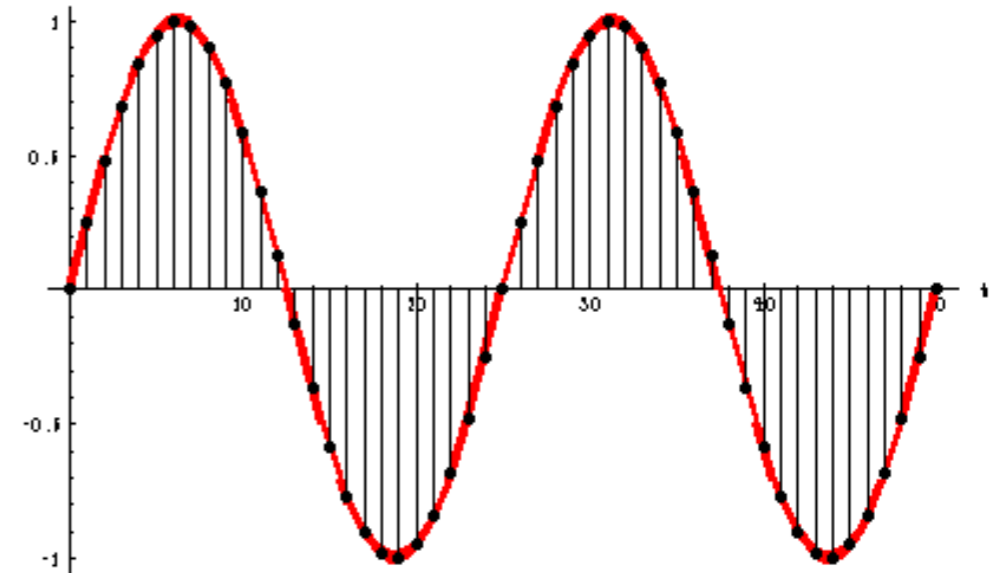
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GBT Diffuse Ionized Gas Survey (GDIGS)

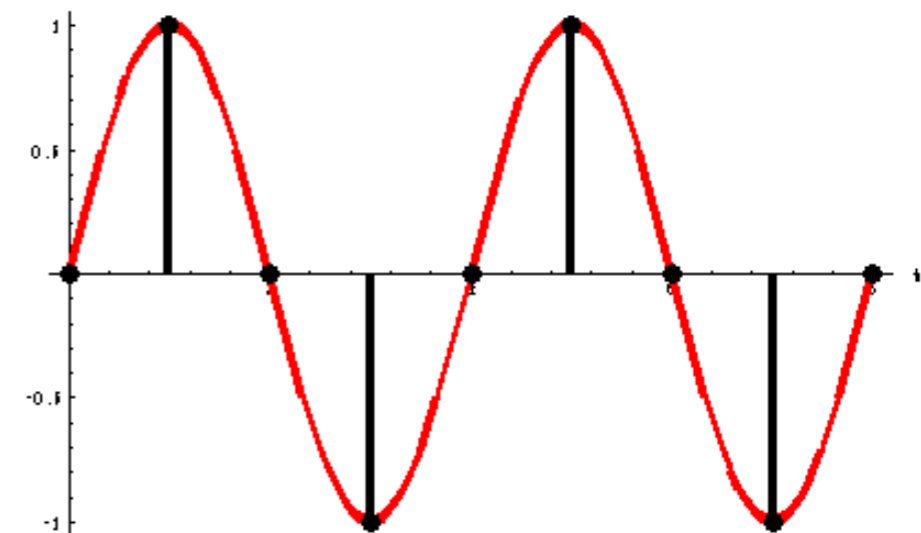
- What is the dynamical state and distribution of the WIM?
- Why is the ionization state of the WIM different than that of H II regions?
- How do the leaking photons from H II regions impact the emission from dust?
- **Understanding the distribution, state, and relationship of HII regions and the WIM will tell us about the evolution of gas in the Interstellar Medium.**

GBT Diffuse Ionized Gas Survey (GDIGS)

- $32^\circ > l > -5^\circ$, $|b| < 0.5^\circ$
- On-the-Fly mode
- 4-8 GHz, Nyquist-sampled
- 64 lines
 - 22 Hn α ,
 - 26 Hn β
 - 8 Hn γ
 - 8 molecular lines

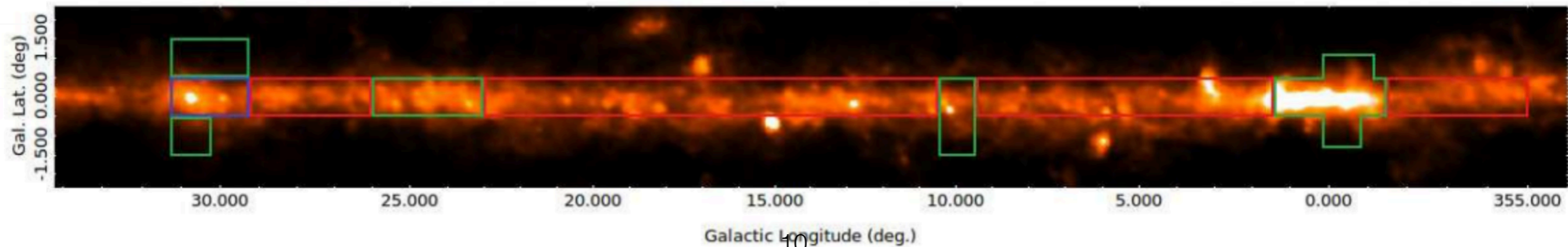


Nyquist sampling



GBT Diffuse Ionized Gas Survey (GDIGS)

- H_2CO - 4.829 GHz
Formaldehyde
- H_2^{13}CO - 4.593 GHz
- CH_3OH - 6.669 GHz
- CH_2NH
- HC_5N
- CCS
- HC_9N_2
- HCN

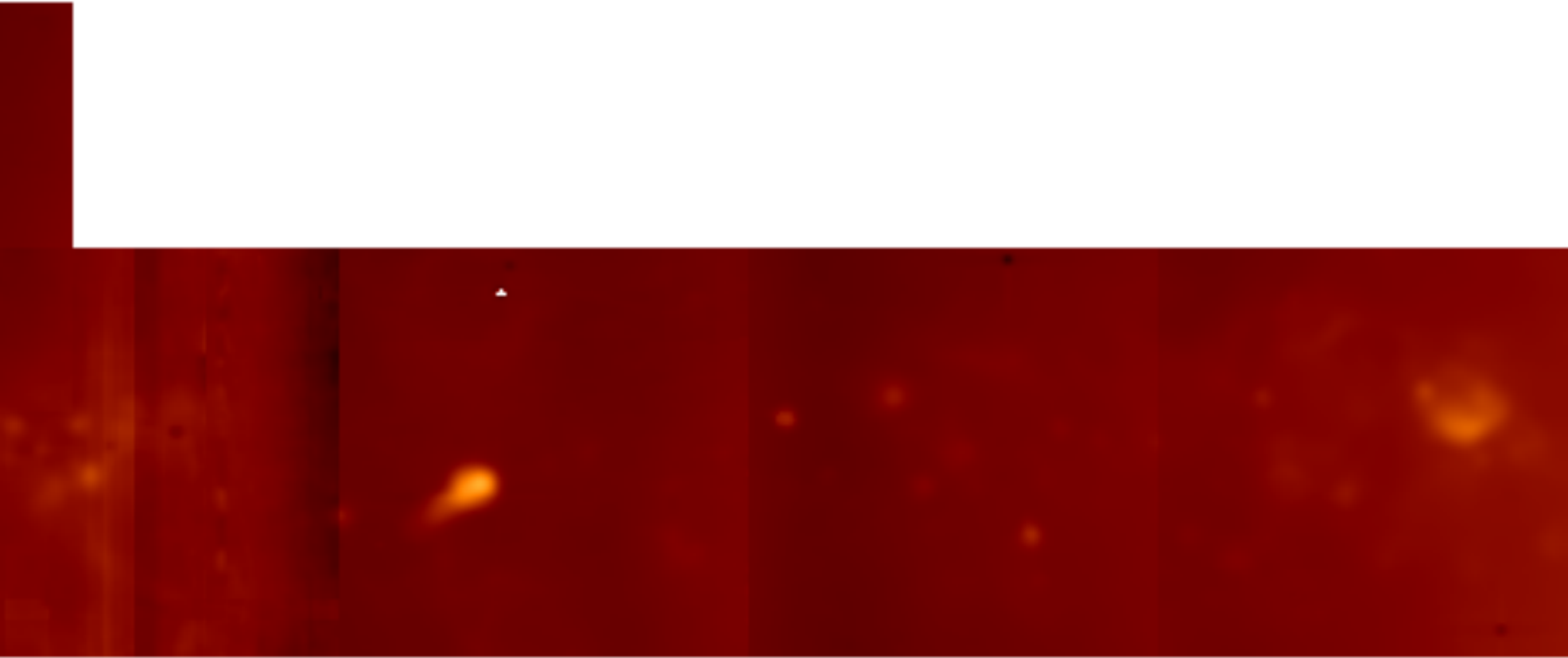


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Data Processing

1. Continuum maps (GBTgridder)
2. De-streaking (NOD3)
3. Averaging
4. Stitching together (Montage)



$l = -5 \text{ deg}$

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Science?

- Continuum intensity of HII Regions
- Continuum intensity of WIM
- Line - to - continuum ratios

Goal: gain insights into the relationship of WIM and HII Regions

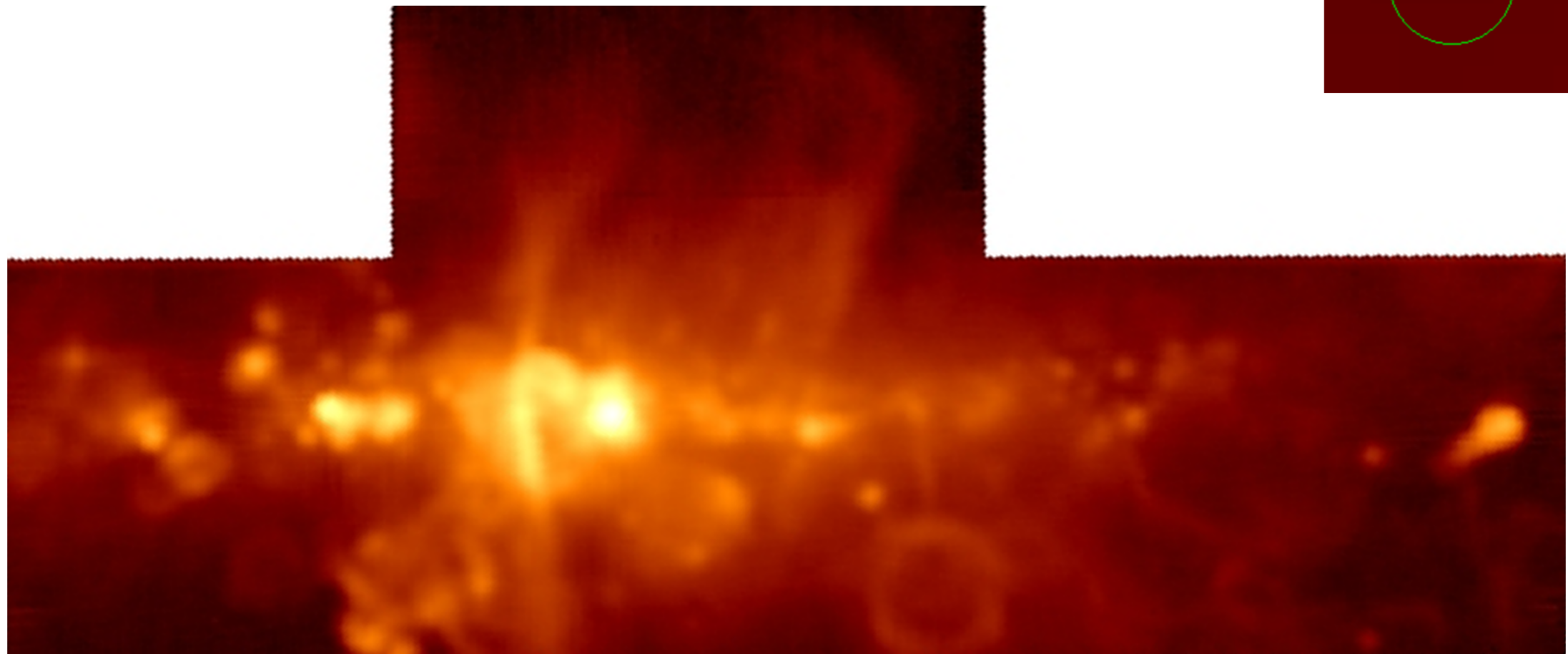
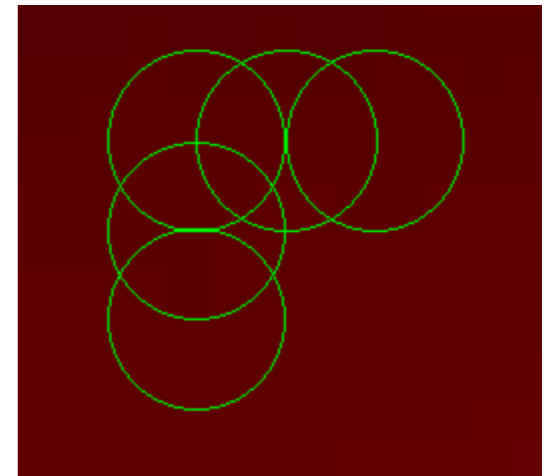
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Quality Checks

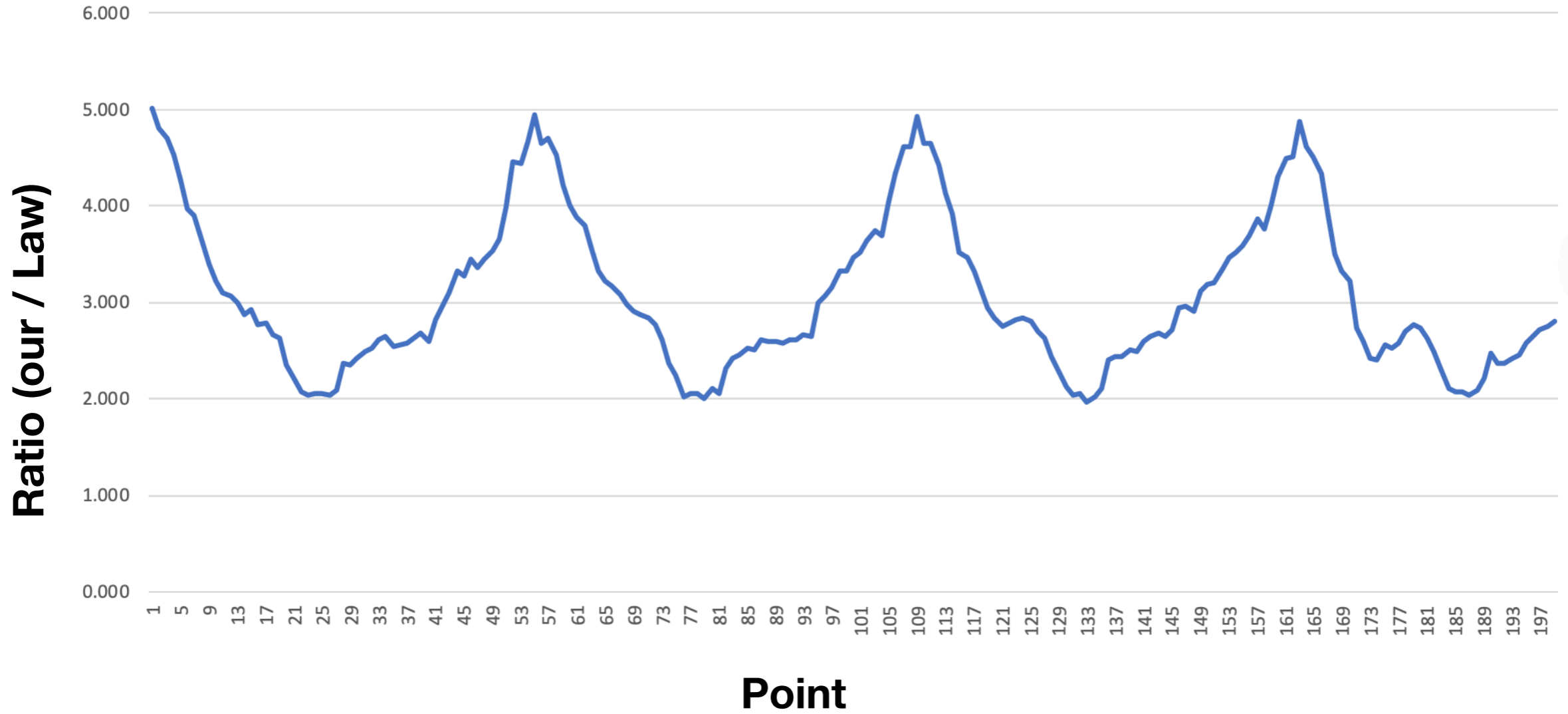
J.C. Law map

Not to scale



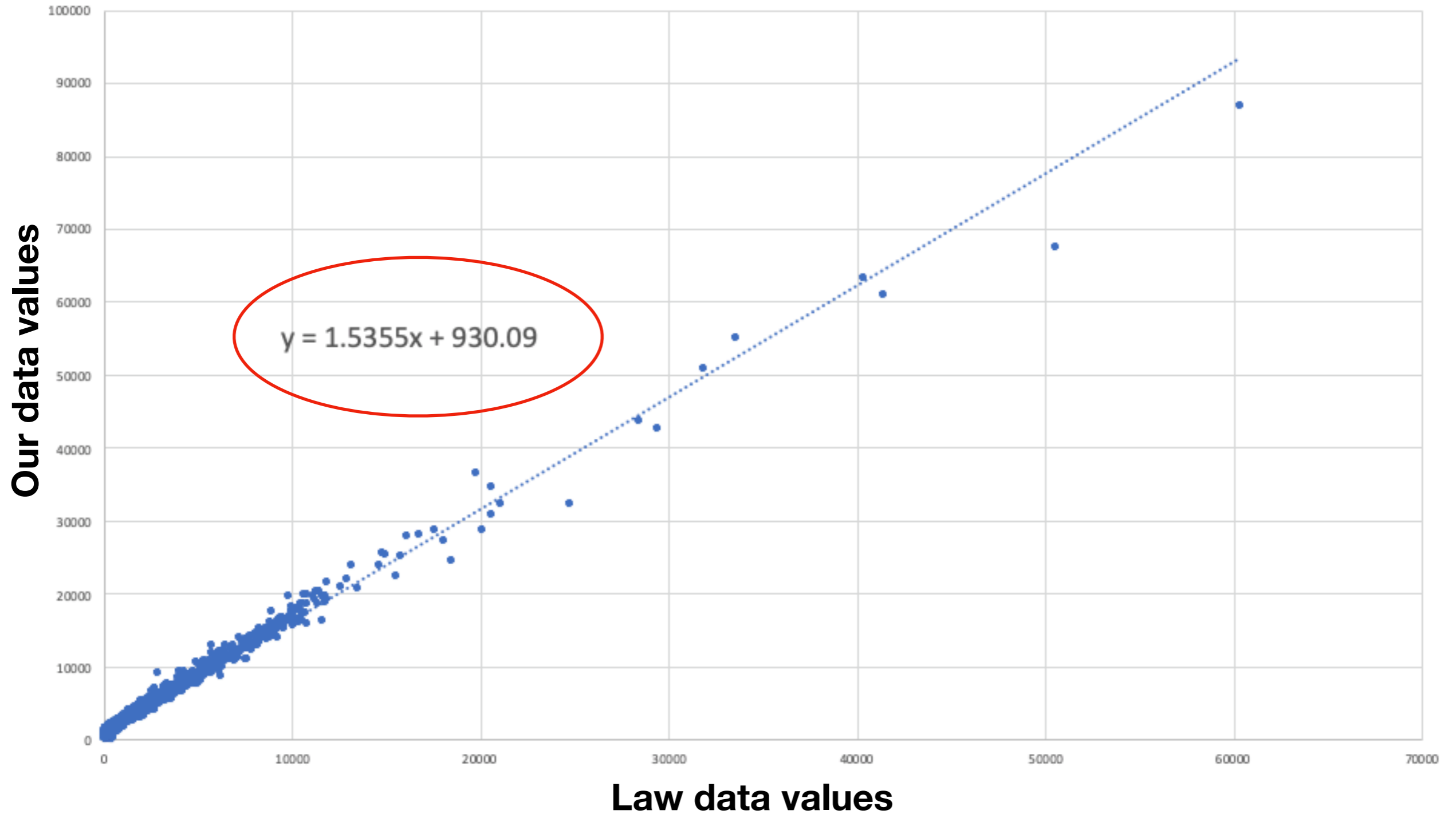
Quality Checks

Our data / J.C.Law data



Quality Checks

Scatter plot of mean values for our and Law's data



Next Steps

- Make the map look nice
 - Match intensities on stitches
 - Manually remove RFI frames
- Compare mapping techniques



Thank you

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