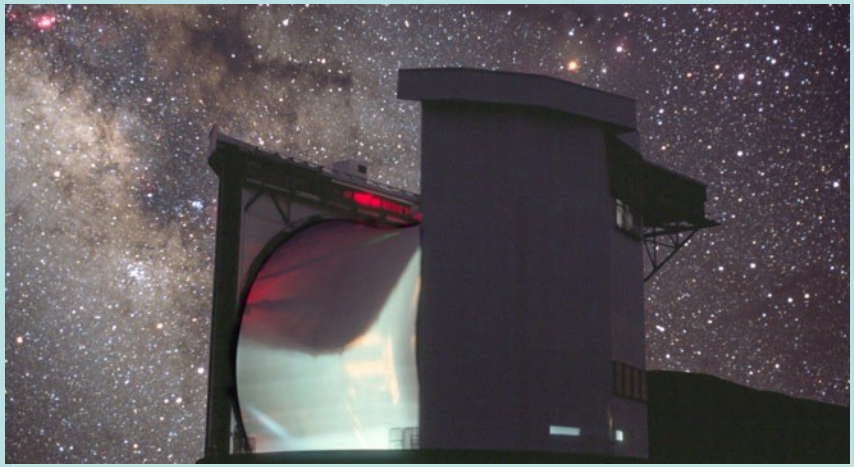
JCMT Legacy Surveys

- Extragalactic
- Nearby Galaxies
- Spectral Legacy Survey
- Debris Discs
- Gould Belt
- “All-sky” (SASSy)
- JCMT Plane Survey



SCUBA-2 undergoing testing in the laboratory at UK ATC

JCMT Plane Survey (JPS) consortium

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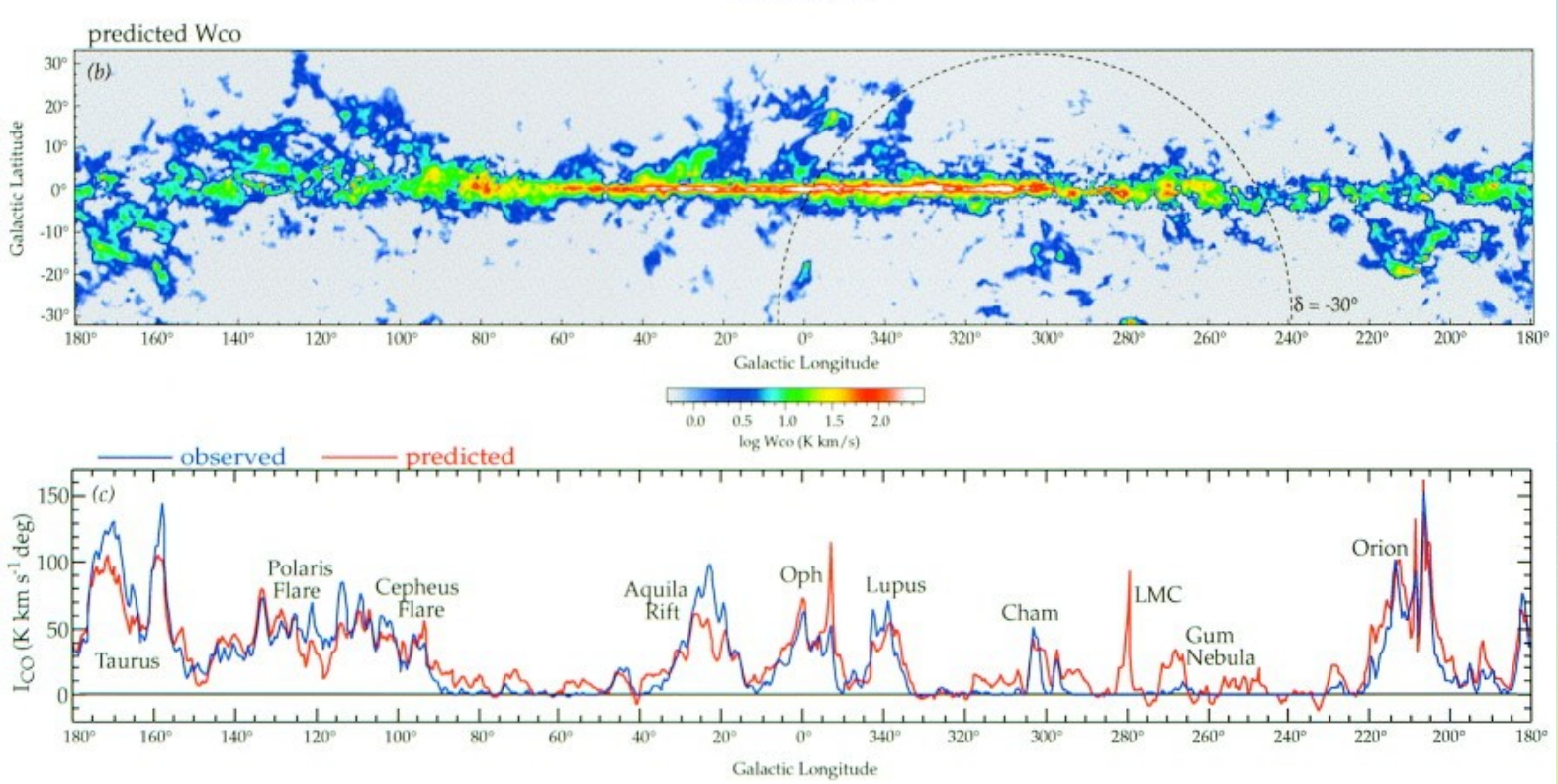
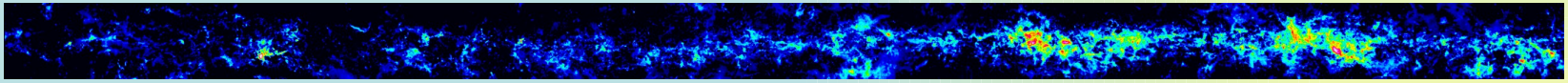
JPS basics

- SCUBA-2 850 and 450μm 14 and 8 arcsec resolution
- Galactic Plane coverage: $-10º < l < 250º$ $|b| < 1º$
- Water vapour criterion: $0.05 < \tau(CSO) < 0.08$ (band 2)

- Stage 1 (Mar 2008 – Dec 2009?) 334 hours (40 shifts)
  - Spitzer GLIMPSE North region $10º < l < 65º$
  - FCRAO ^{12}CO outer Galaxy region $100º < l < 145º$
- Stage 2 (2010 – 2012?) 377 hours (provisional)
  - Remainder of longitude range
  - Galactic Centre $-10º < l < +10º$
  - Contiguous off-plane regions ~10 deg^2

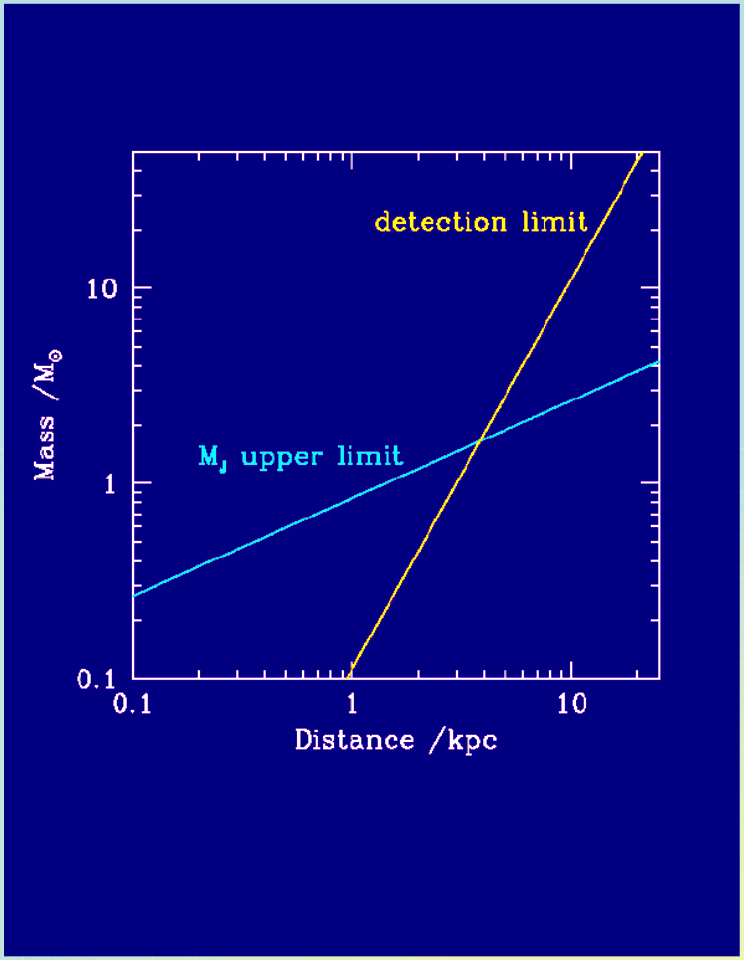
JPS coverage





JPS detection limits

- 1σ = 4 mJy at 850μm
- Completeness ~1 solar mass per beam at 3 kpc
- 40 solar masses at 20 kpc
- All massive star formation in the Galaxy
- Beyond ~3kpc, all unresolved sources have M > M_{Jeans} (T=20K)



JPS Science

- Evolution of high-mass young stellar objects
  - Timescale of earliest (pre-IR) phases
  - SED sequence
- Triggering, clustering & environment
  - Effects of local feedback within clouds (SFE & MF)
  - Galaxy-scale effects
- Origins of molecular clouds
  - IR dark & HI absorption clouds
  - Dust properties
- Galactic Structure
  - Location of current high-mass SF

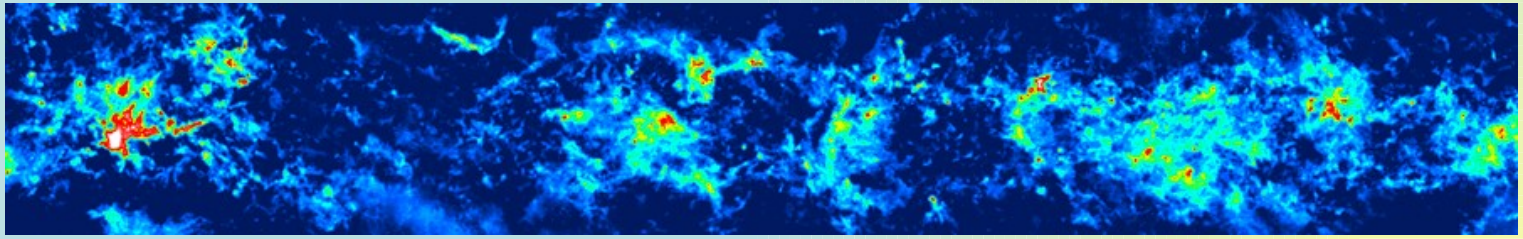
JPS data products & legacy

- Archived scan maps 450 & 850µm
- General source catalogues (PSC)
- Science-driven (filtered) catalogues (extended sources, associations, etc) & samples
- Emissivity maps

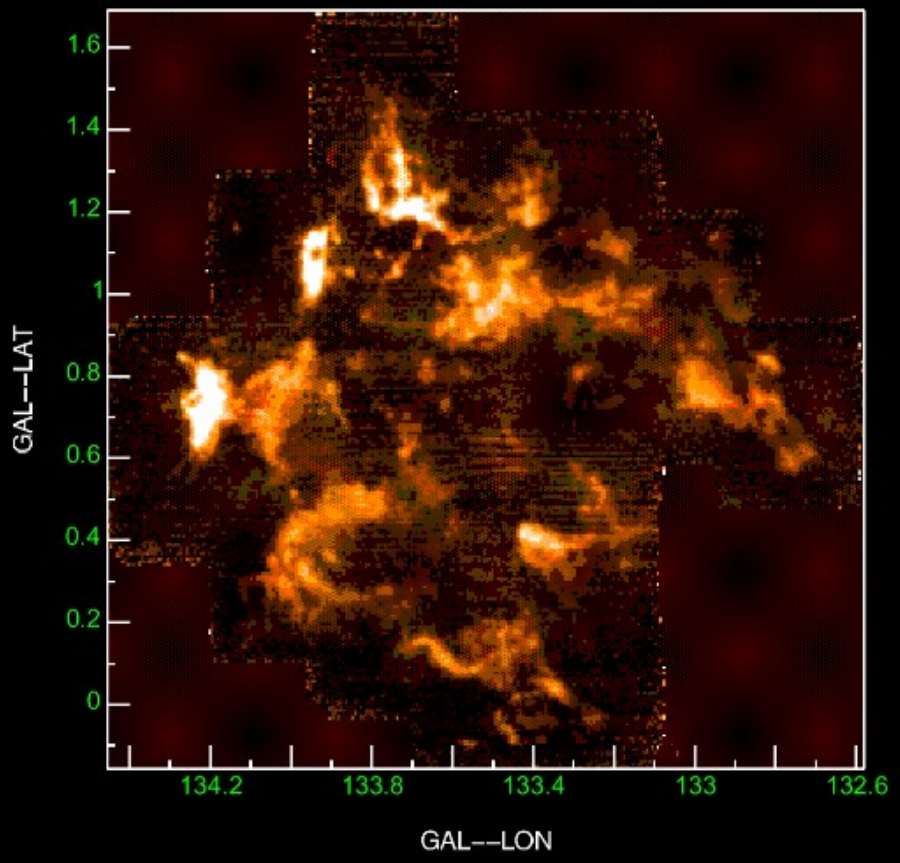
- Proprietary period: public data release 12 months after last observations (end 2010?)
- First release: Inner Galaxy area?

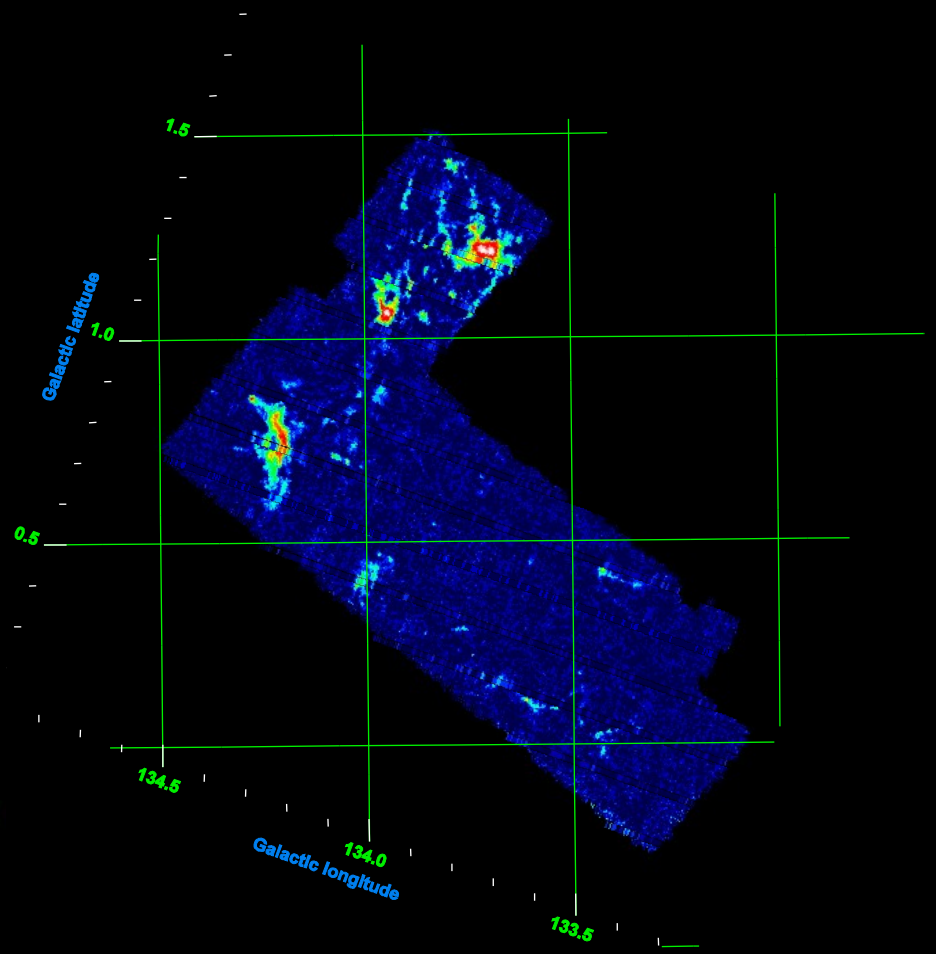
Complementary Galactic Plane Surveys

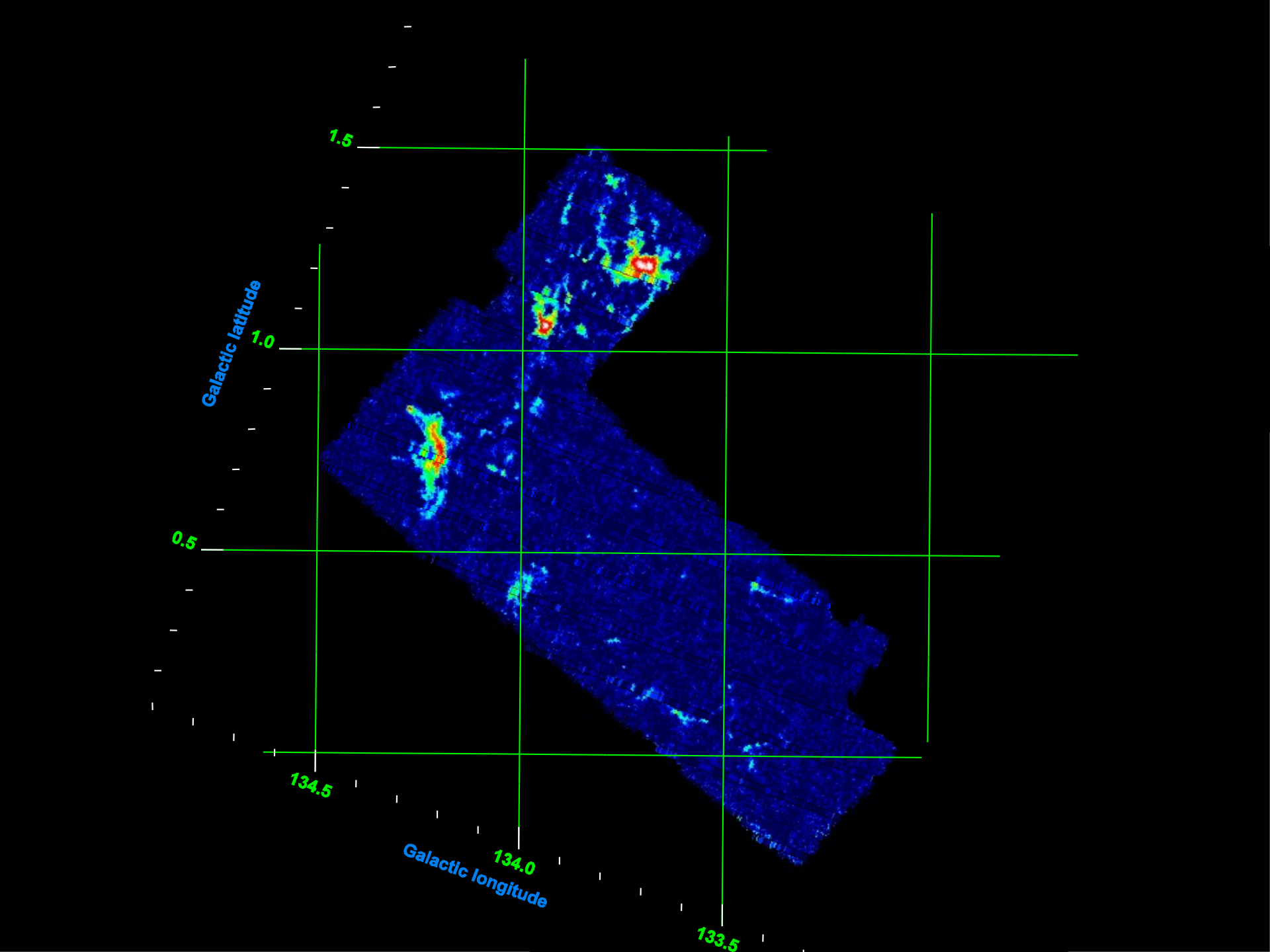
- HI-GAL: 60-520μm 18″ at 250μm 20mJy (2008?)
- ASTRO-F/Akari: 50-200μm 30-50″ 20-60 mJy (2006)
- Spitzer GLIMPSE & MIPSGAL: 3.6-24μm $10^{o} < l < 65^{o}$ $|b| < 1^{o}$
- UKIDSS at UKIRT: J HK $|b| < 5^{o}$
- BU-FCRAO GRS: ^{13}CO J=1-0 $18^{o} < l < 52^{o}$
- FCRAO Outer Galaxy Survey: ^{12}CO J=1-0 $100^{o} < l < 145^{o}$
- CORNISH 5GHz VLA survey of GLIMPSE region (2006/7)
- ATLASGAL APEX/LABOCA 870μm $-80^{o} < l < 20^{o}$ $|b| < 1^{o}$
- **...**

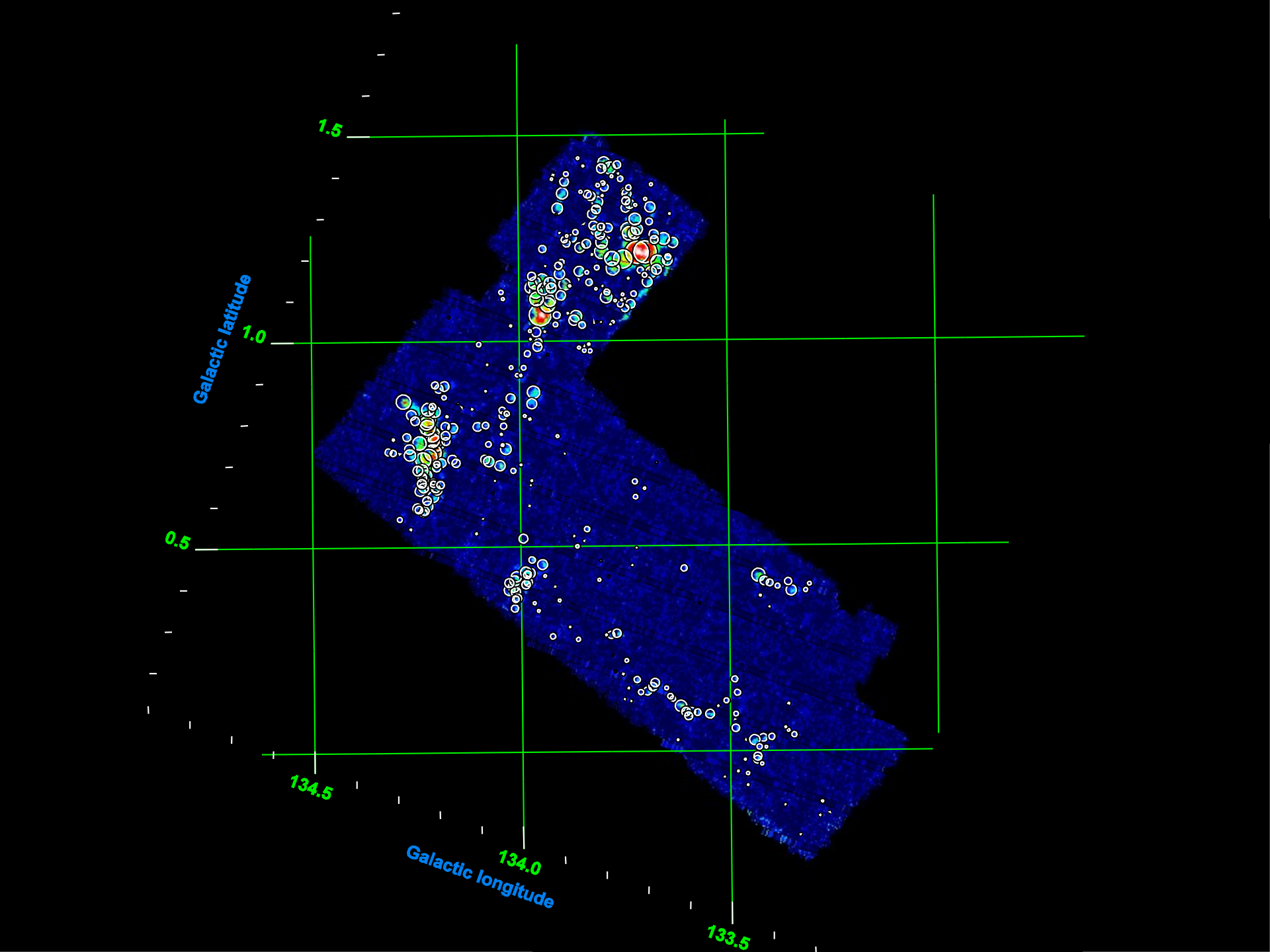


W3 GMC in CO J=1-0 & 850um continuum



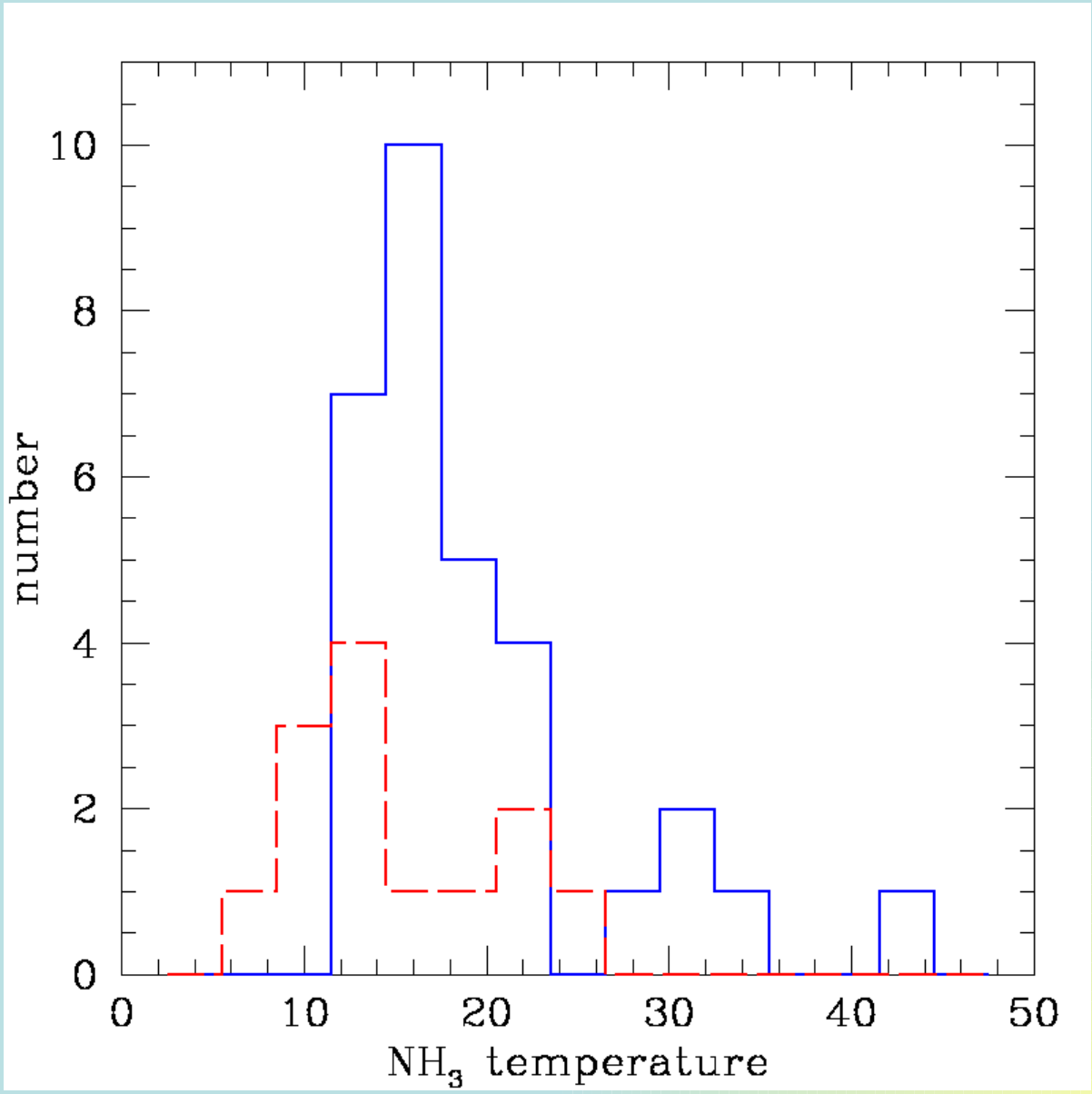



1.5
1.0
0.5
Galactic latitude
134.5
134.0
133.5
Galactic longitude


1.5
1.0
0.5
Galactic latitude
134.5
134.0
133.5
Galactic longitude

W3 GMC clump sample

- ~300 dense clumps found above the noise contamination limit (>13 $M_{\odot}$)
- 20K thermal Jeans mass of source just filling beam ~1 $M_{\odot}$
- 86% by mass, 69% by number of clumps are in the compressed region (HDL)


number
0
2
4
6
8
10
0
10
20
30
40
50
NH3 temperature

W3: Fraction of mass in dense clumps

- GMC total gas mass (CO) = 3.8 x 10^5 $M_{☉}$
  - mean gas density 4 x 10^7 m^{-3} : filling factor <5%

- Compressed Layer gas mass = 1.5 x 10^5 $M_{☉}$
  - dense clump total mass = 3.8 x 10^4 $M_{☉}$
  - dense clump mass fraction = 26% (37%)

- Diffuse Cloud gas mass (SCUBA survey region) = 1.15 x 10^5 $M_{☉}$
  - dense clump total mass = 6.1 x 10^3 $M_{☉}$
  - dense clump mass fraction = 5% (13%)