Giovanni Fazio: Scholar,Gentleman, Innovator, Visionary, Leader, and a Great Guy

I am delighted to take part in this celebration of Giovanni Fazio's enormous impact on astronomy for the past 50 years. Everything that I will mention today has been enabled by IRAC, which like the pink rabbit keeps on going and going and going.

Giovanni,

THANKS FROM THE ENTIRE GLIMPSE TEAM!

Unveiling the Unseen: The Mid-IR Galactic Disk

Ed Churchwell

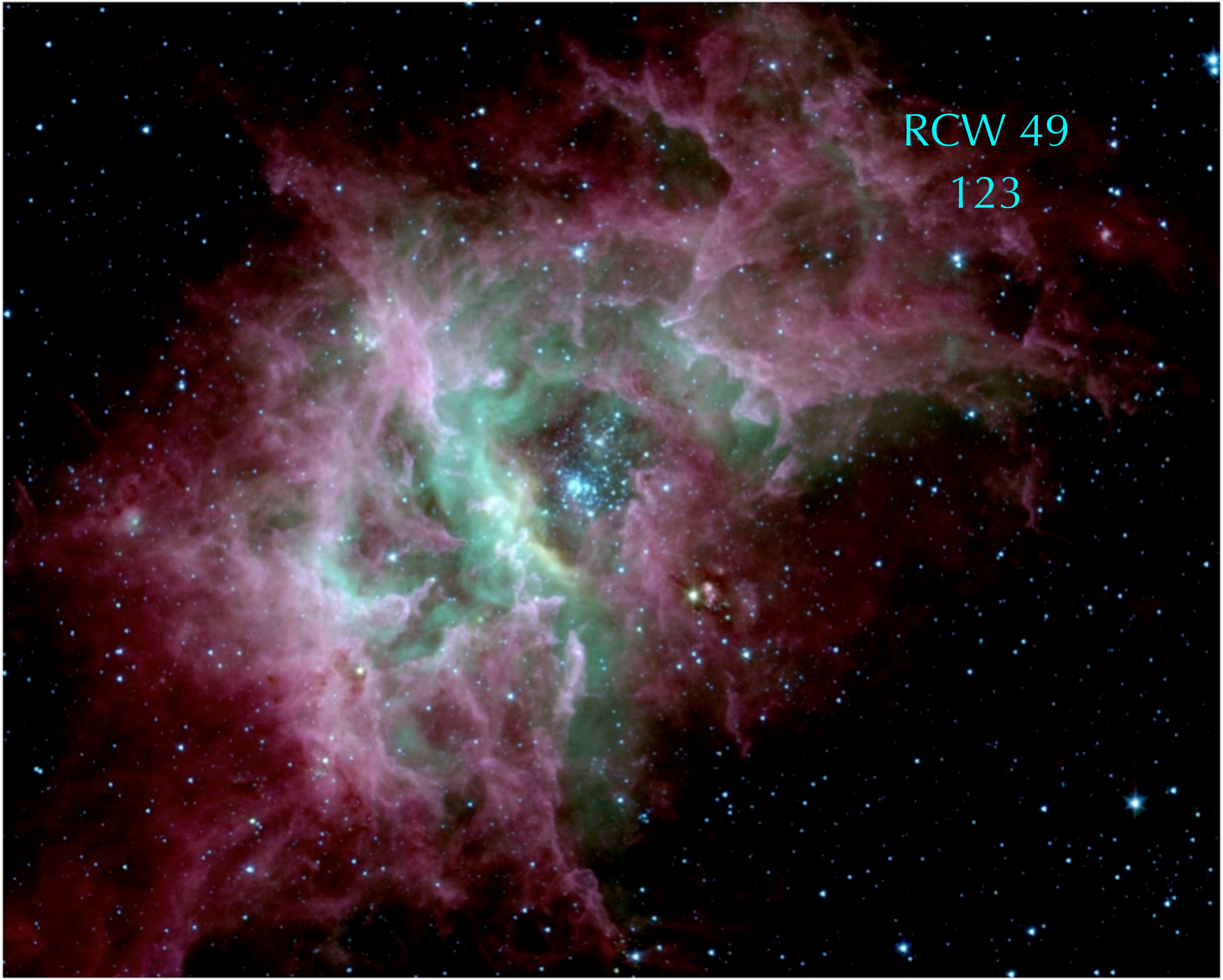
Celebrating 50 Years of Astrophysics

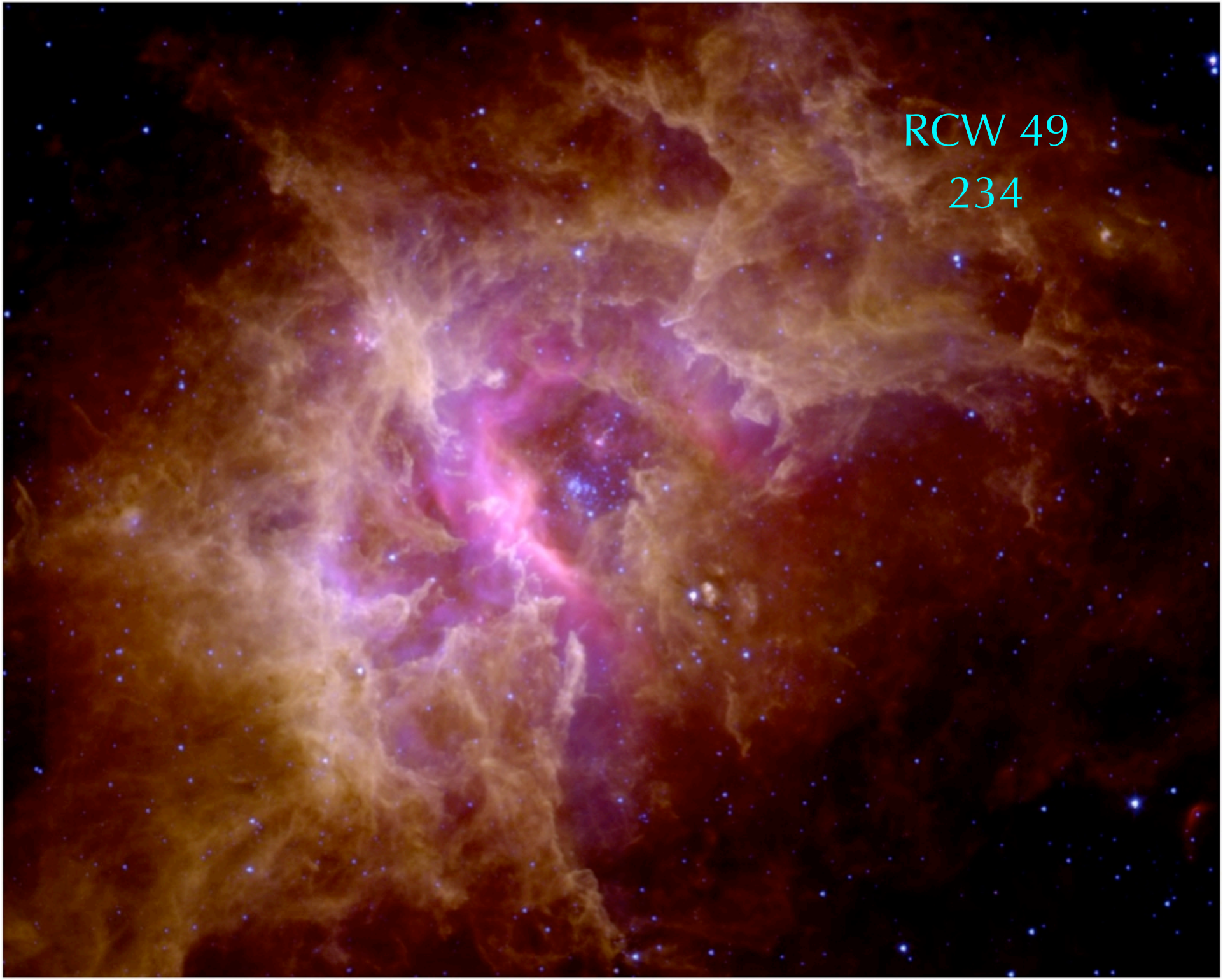
H-S Center for Astrophysics 27-28 May 2009

Hallmarks of the MIR Galactic Disk

- Bubbles/HII regions
- IRDCs
- YSOs
- Diffuse dust/PAHs
- Millions of stars

Bubbles/HII Regions


RCW 49
123


RCW 49
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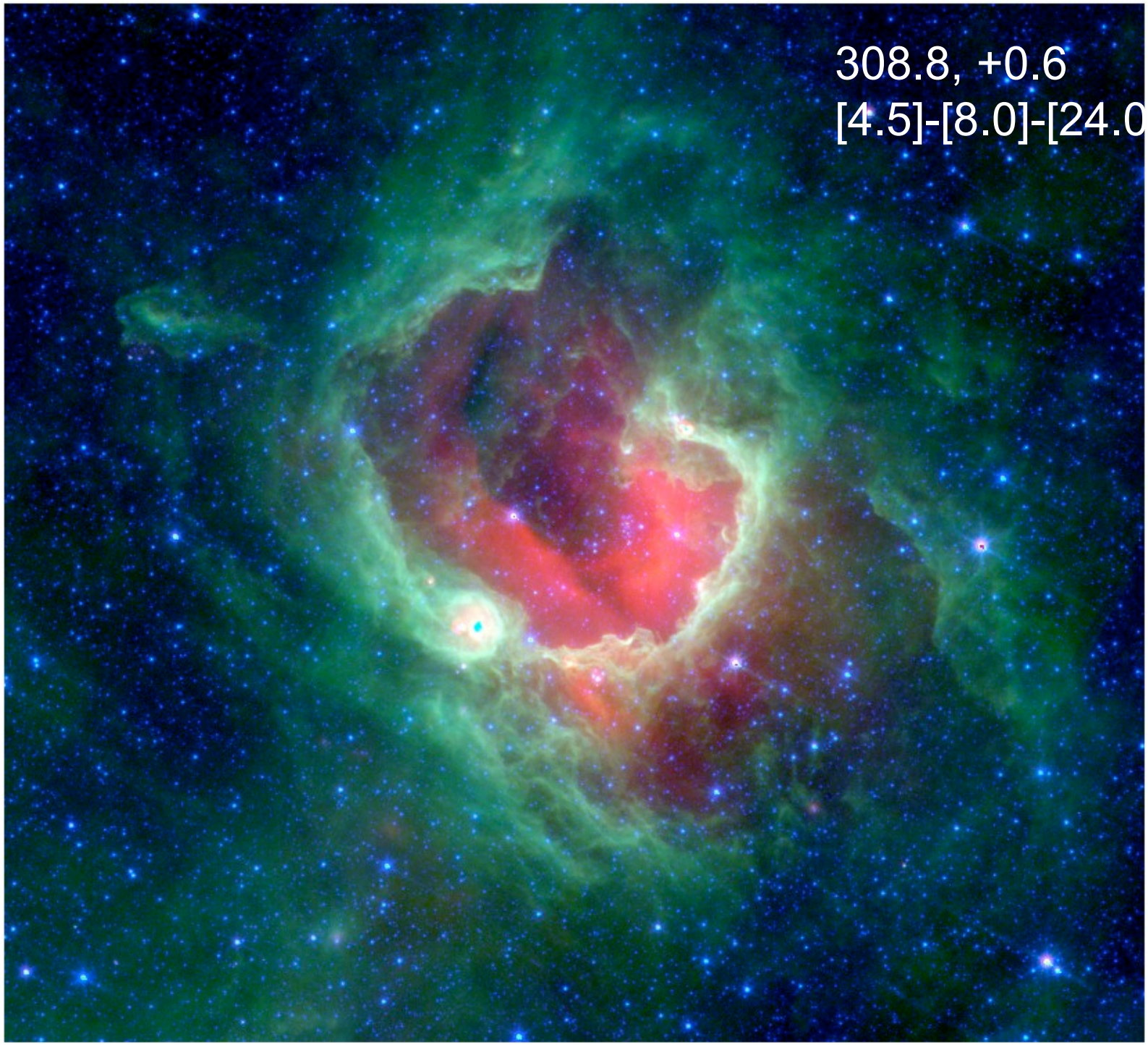
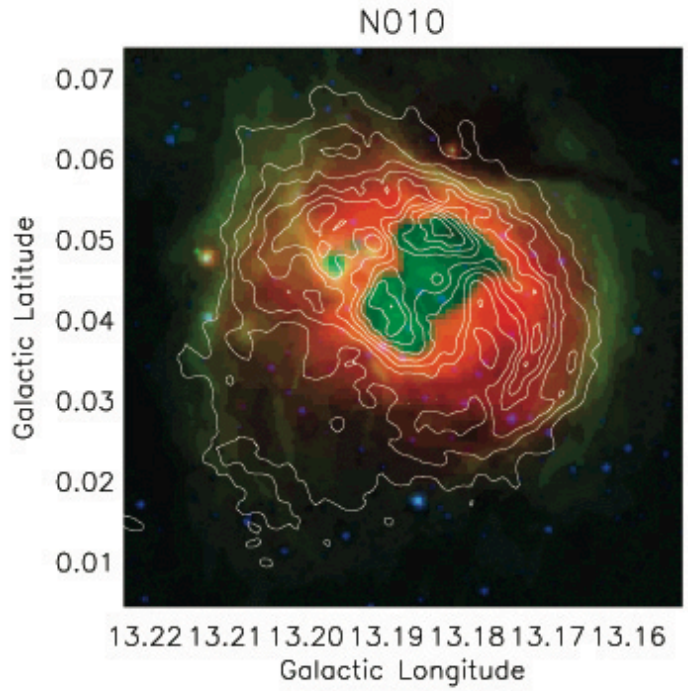
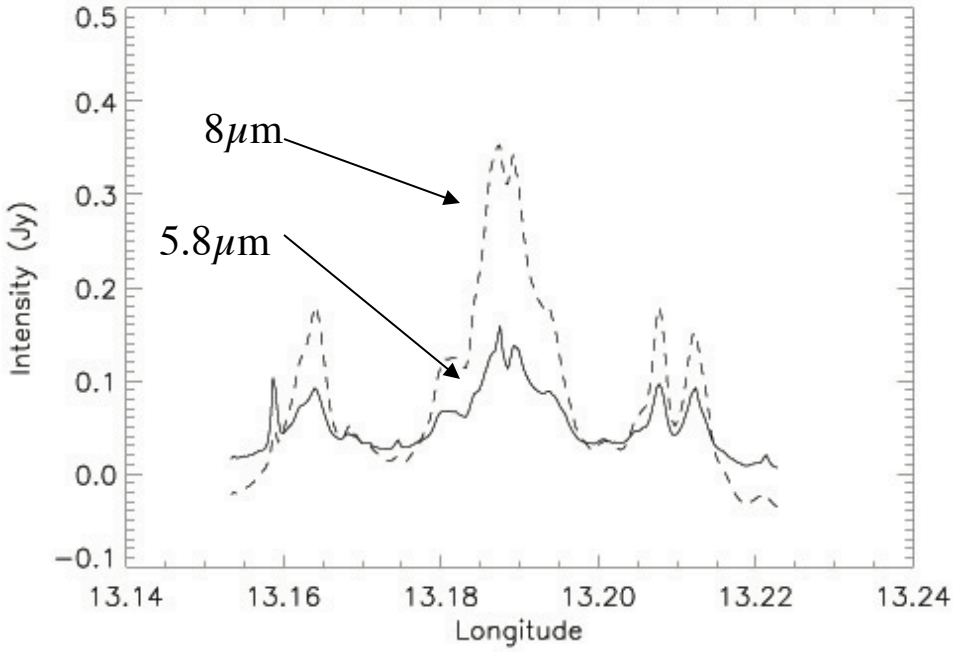
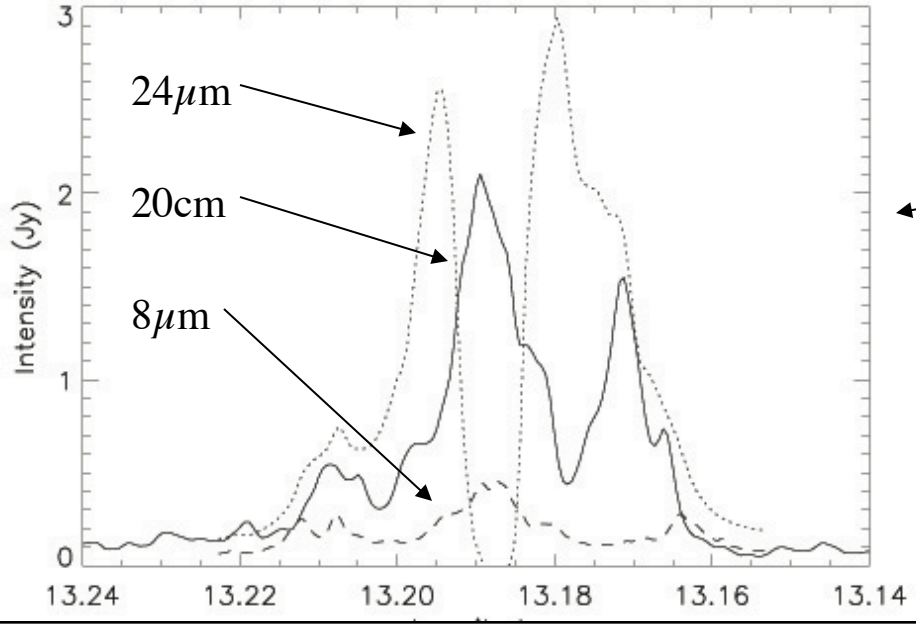
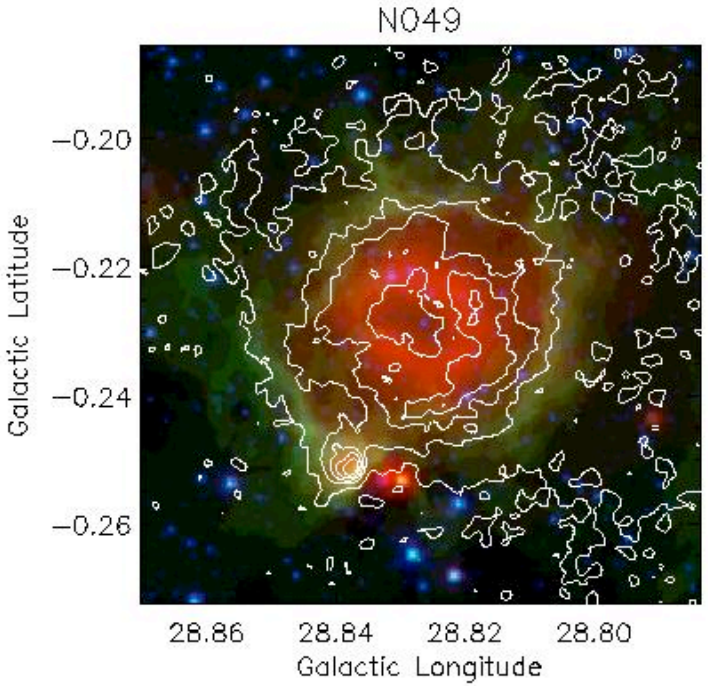

308.8, +0.6
[4.5]-[8.0]-[24.0

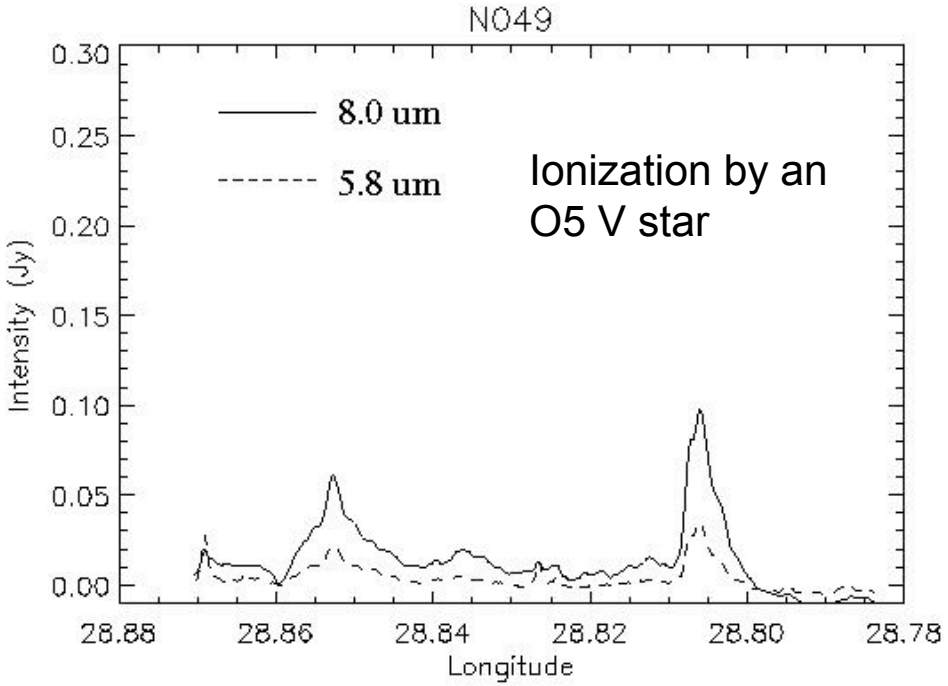


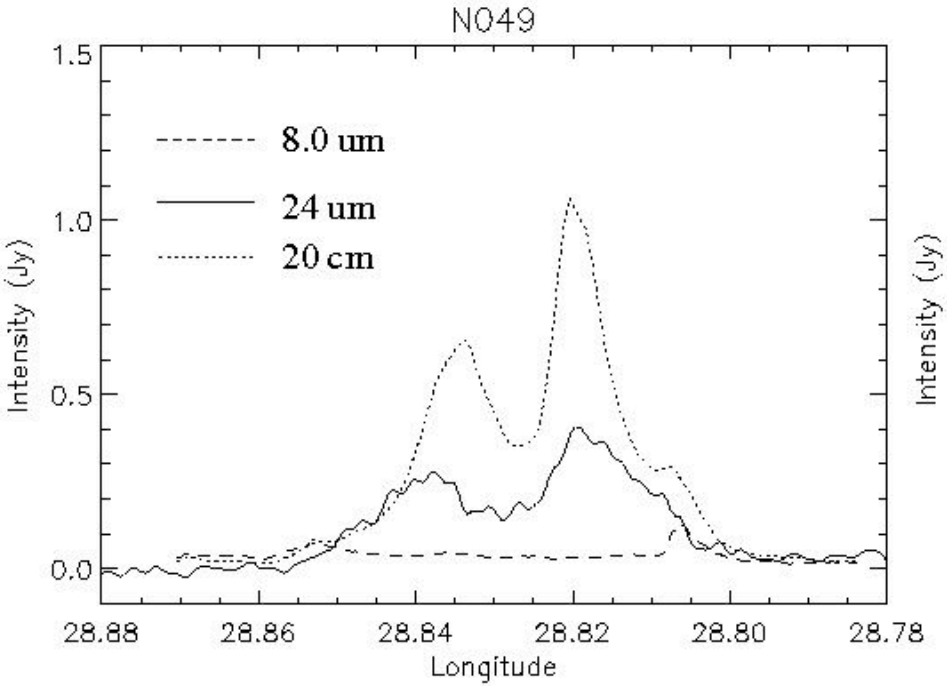


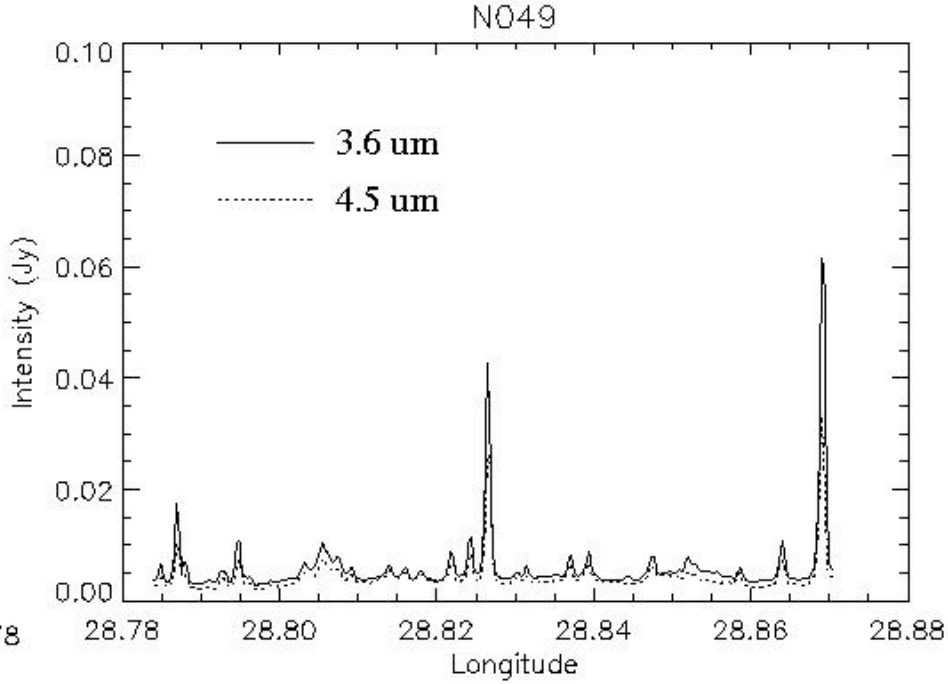


20cm x 10^6; rest to scale
Ionization by several
late O or early B stars

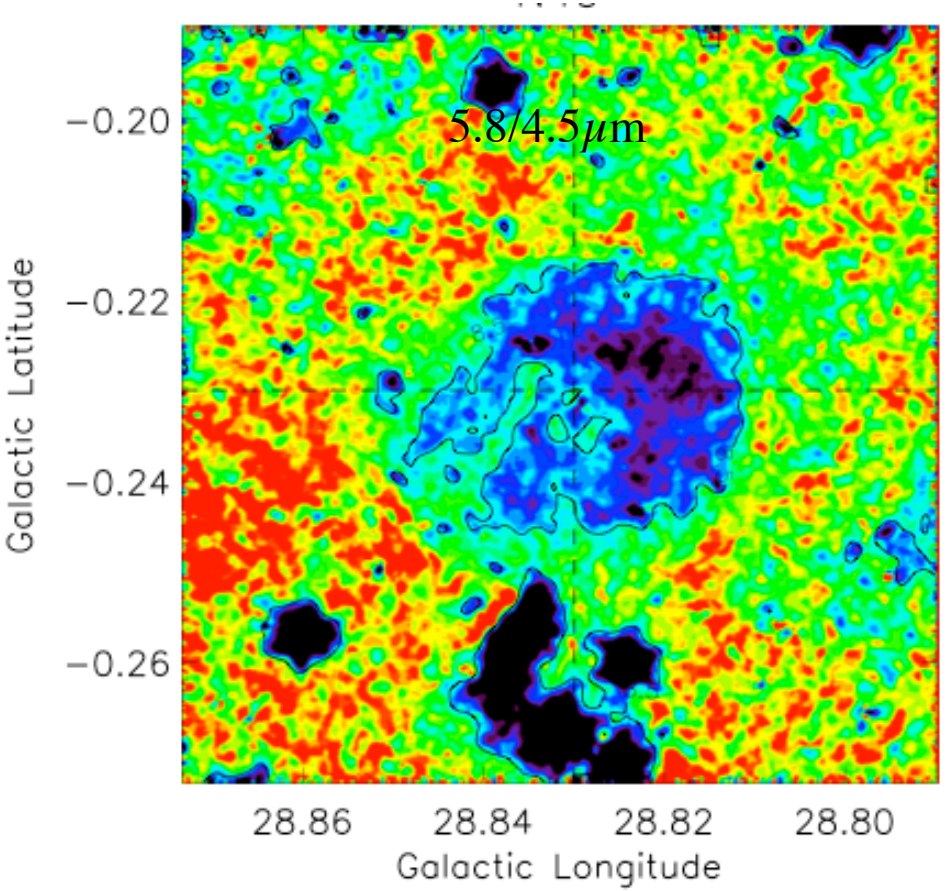

N049
−0.20
−0.22
−0.24
−0.26
Galactic Latitude
28.86
28.84
28.82
28.80
Galactic Longitude

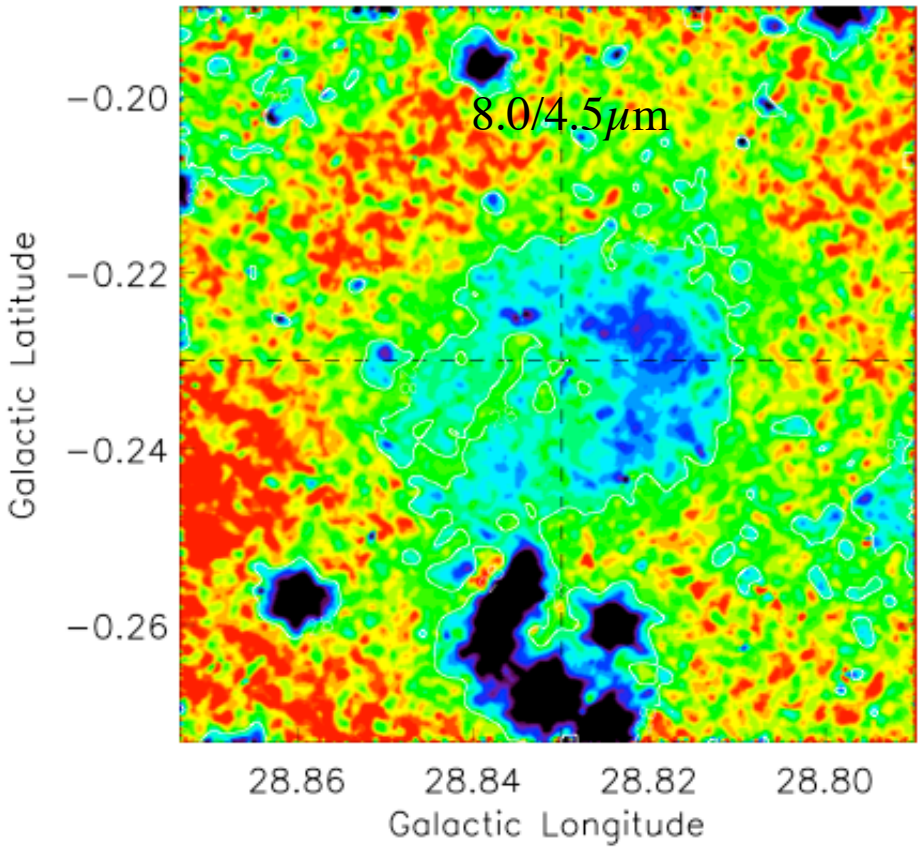

N049
8.0 um
5.8 um
Ionization by an
O5 V star
Intensity (Jy)
0.30
0.25
0.20
0.15
0.10
0.05
0.00
28.88
28.86
28.84
28.82
28.80
28.78
Longitude


N049
8.0 um
24 um
20 cm
Intensity (Jy)
1.5
1.0
0.5
0.0
28.88
28.86
28.84
28.82
28.80
28.78
Longitude


N049
3.6 um
4.5 um
Intensity (Jy)
0.10
0.08
0.06
0.04
0.02
0.00
28.78
28.80
28.82
28.84
28.86
28.88
Longitude

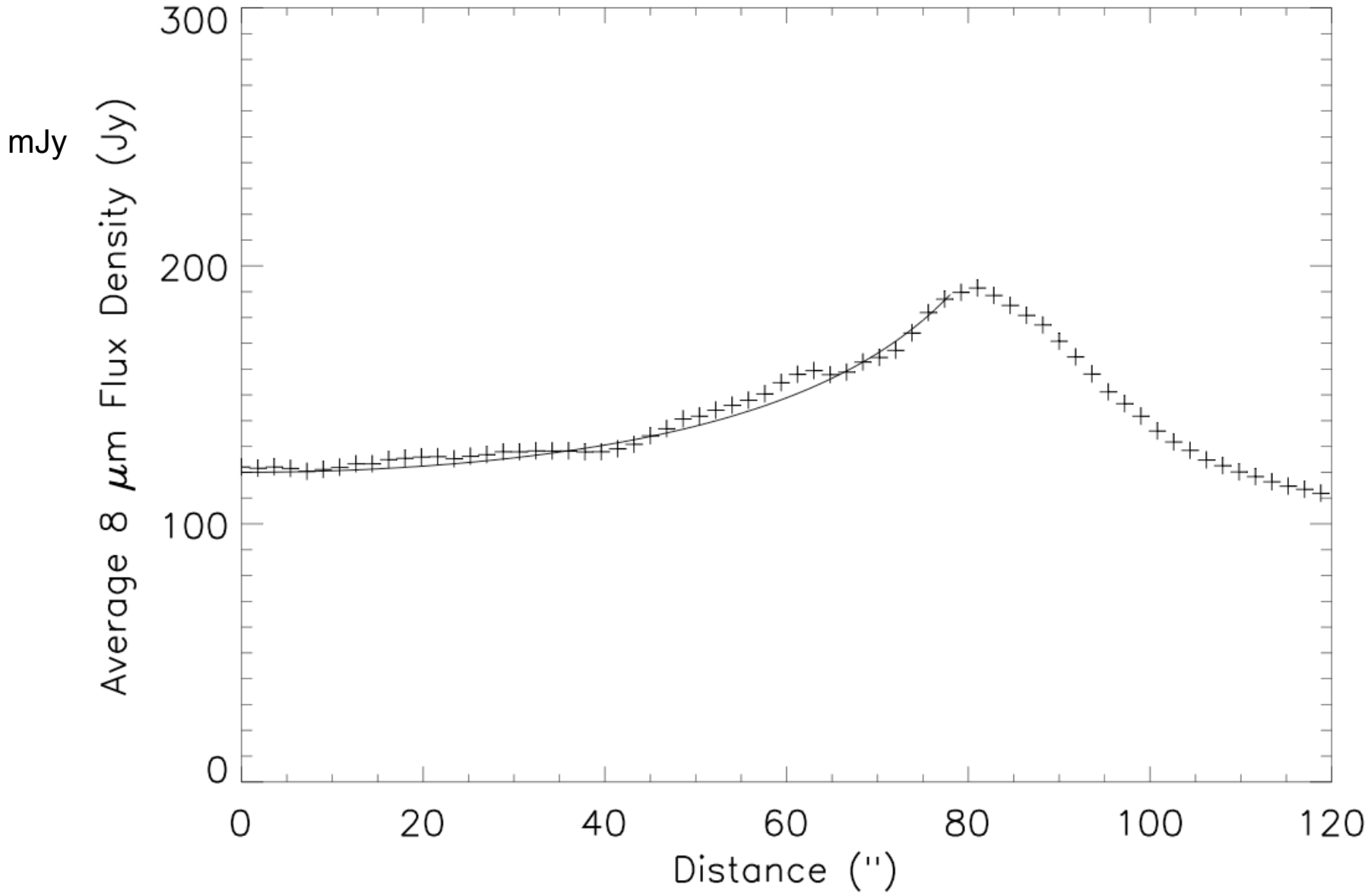
N49: PAH Destruction Radius





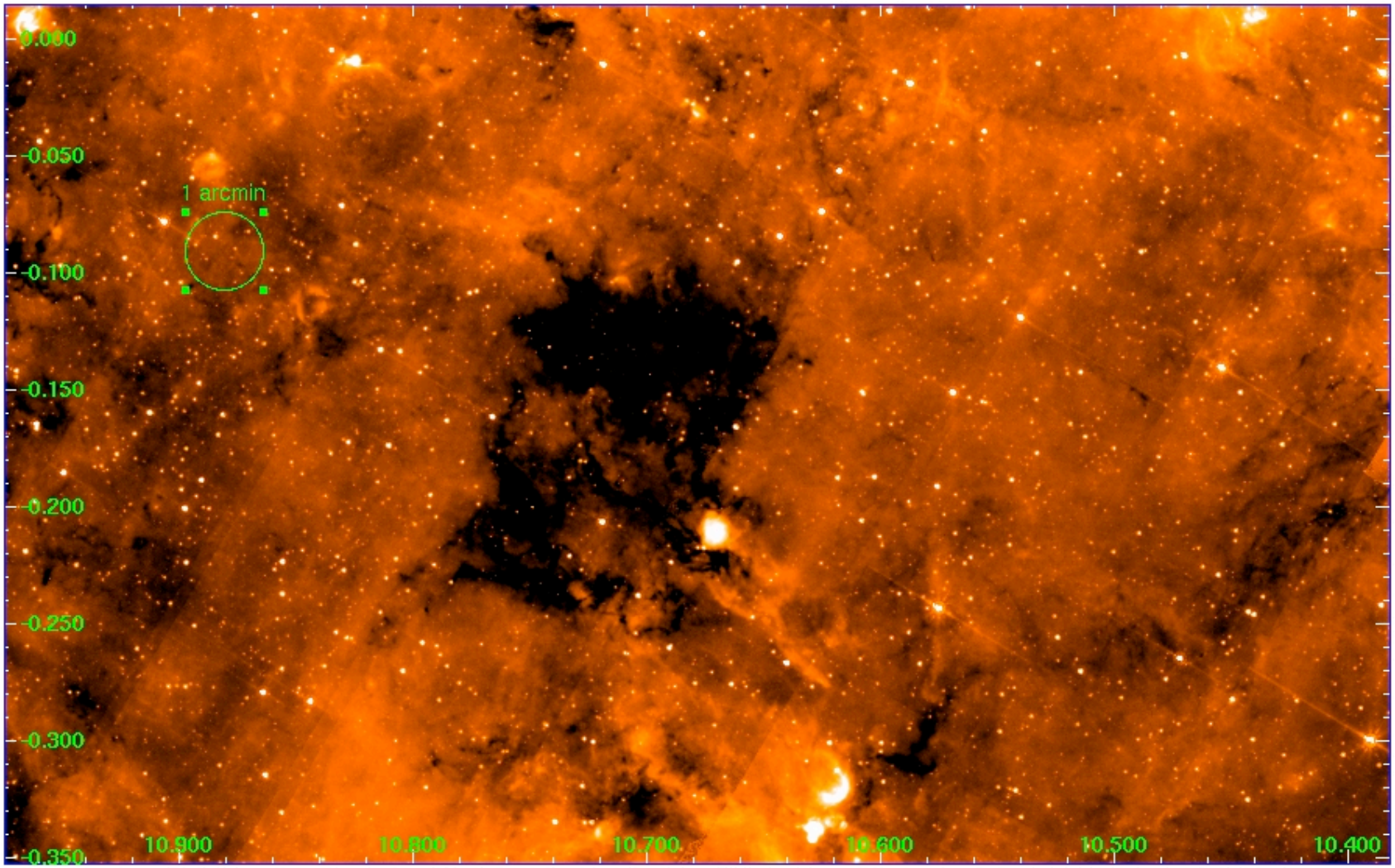
Ang. Diameter ~0.03^0 @ 5.7 kpc => R~1.5 pc

N49: 8μm Observations Azimuthally averaged (+); Model of 8μm Shell Emission (solid curve)

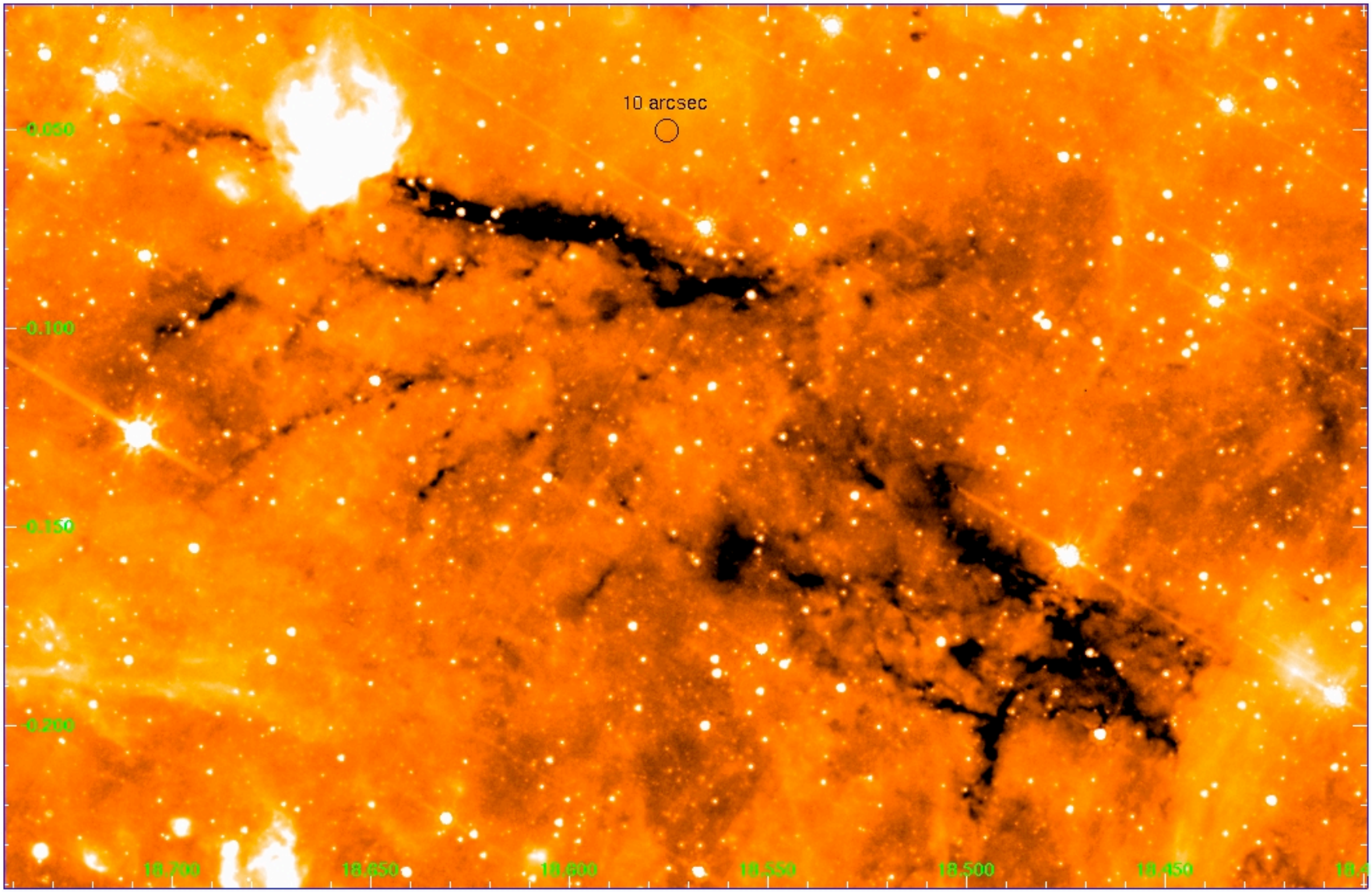


IRDCs

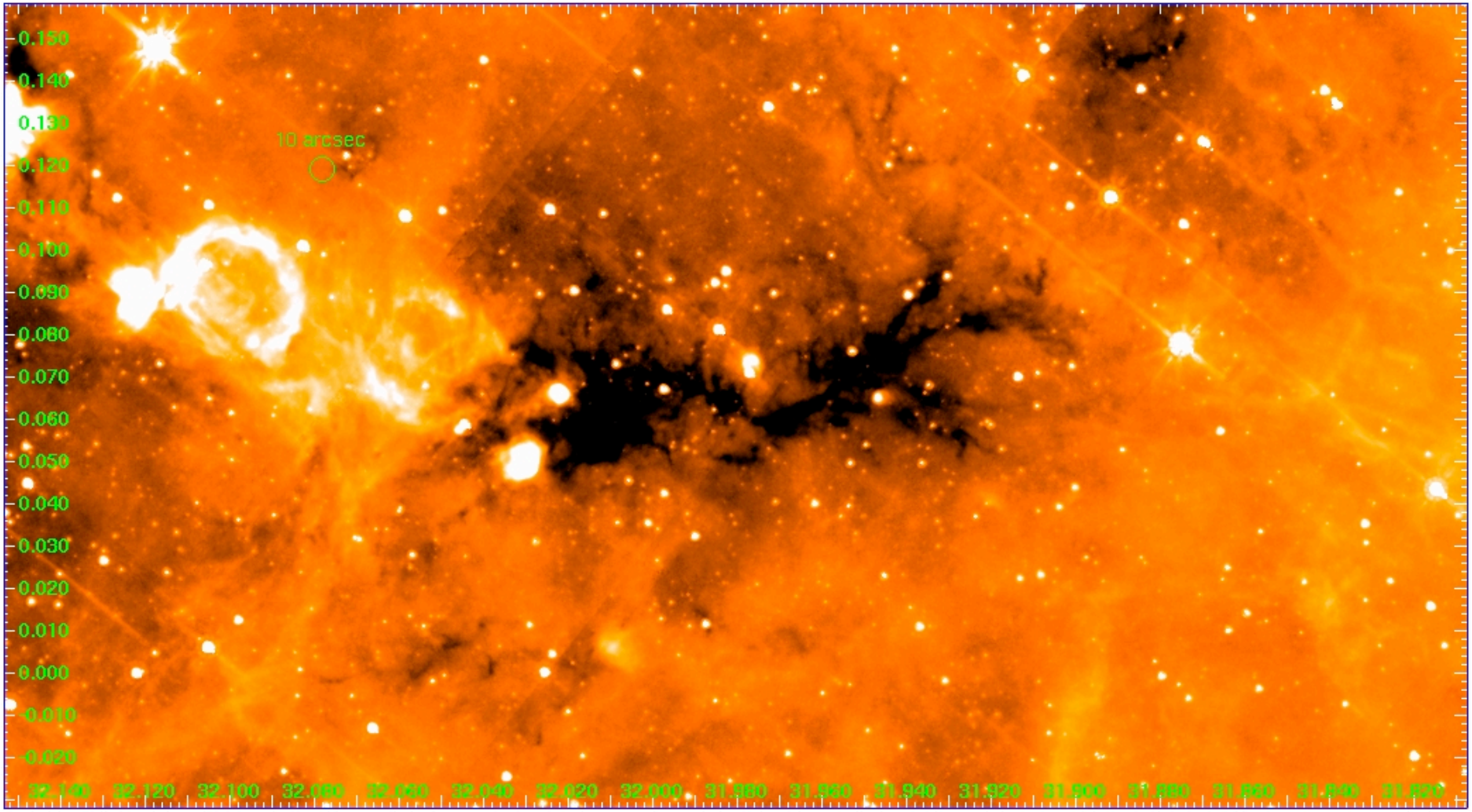
IRDC seen in silhouette (8.0μm)
Opaque at 8μm!



IRDCs seen in silhouette



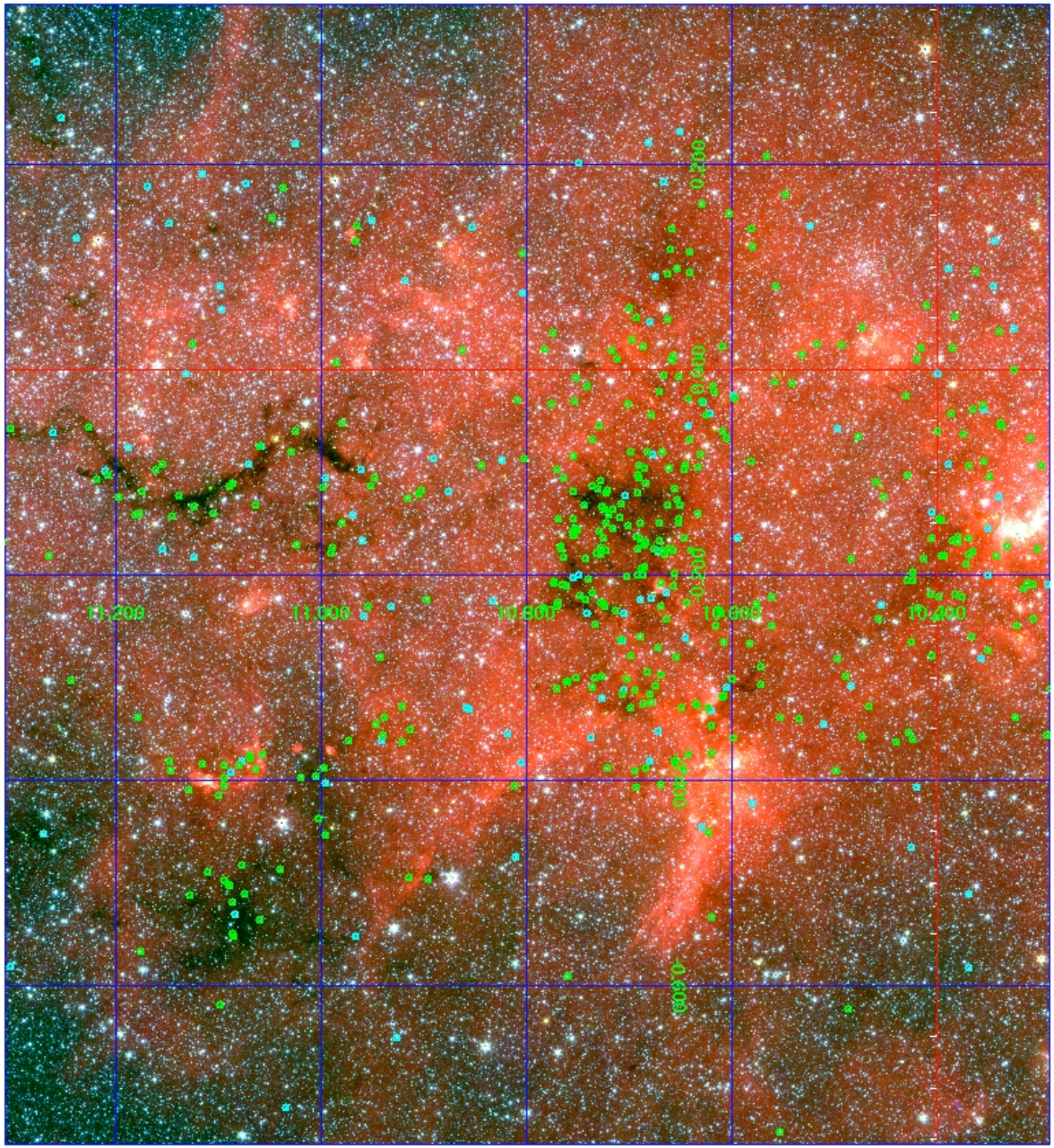
IRDC seen in silhouette
Core opaque at 8μm; Star formation in the extended DC?



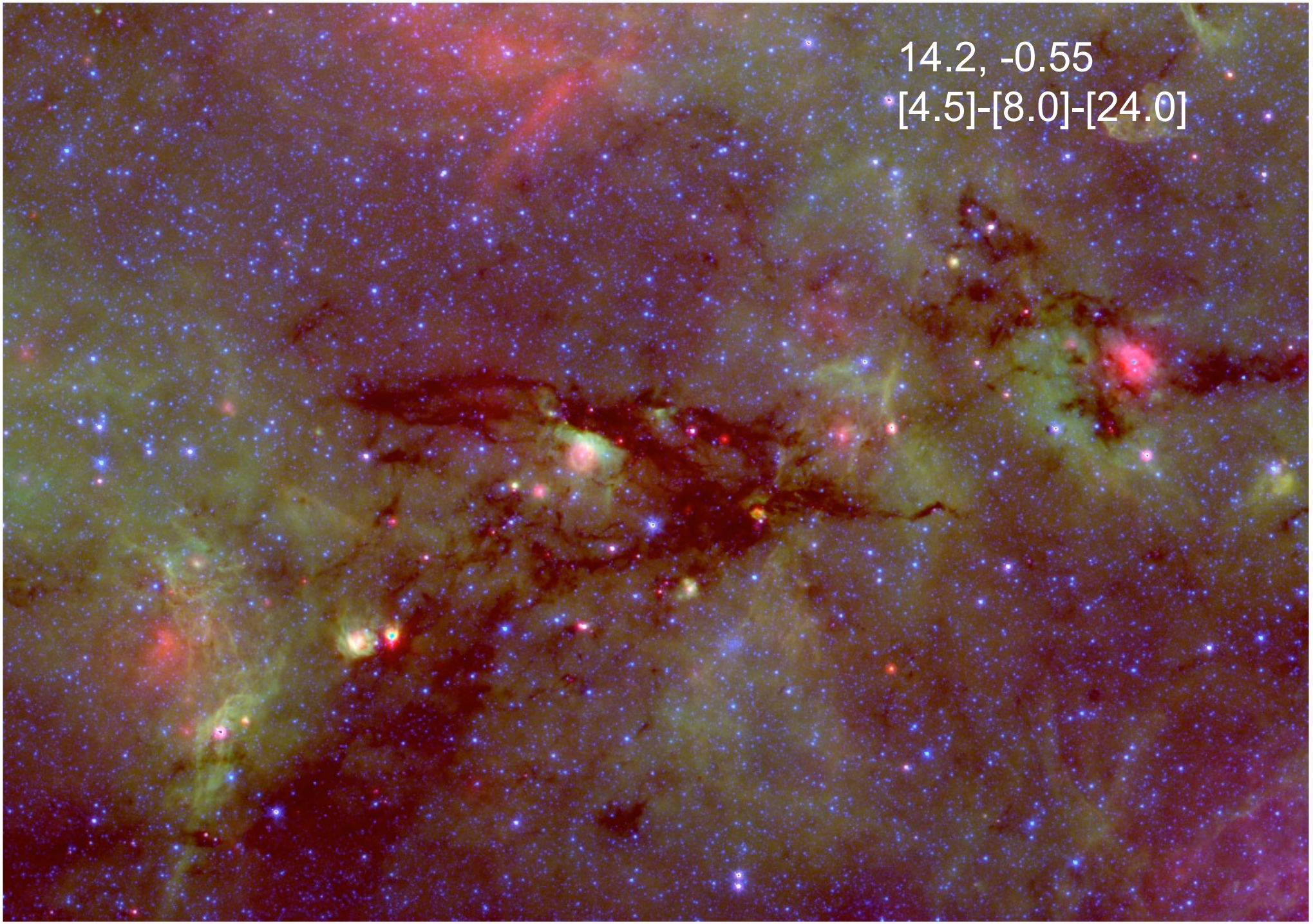
Dark clouds at l~10.8 degrees

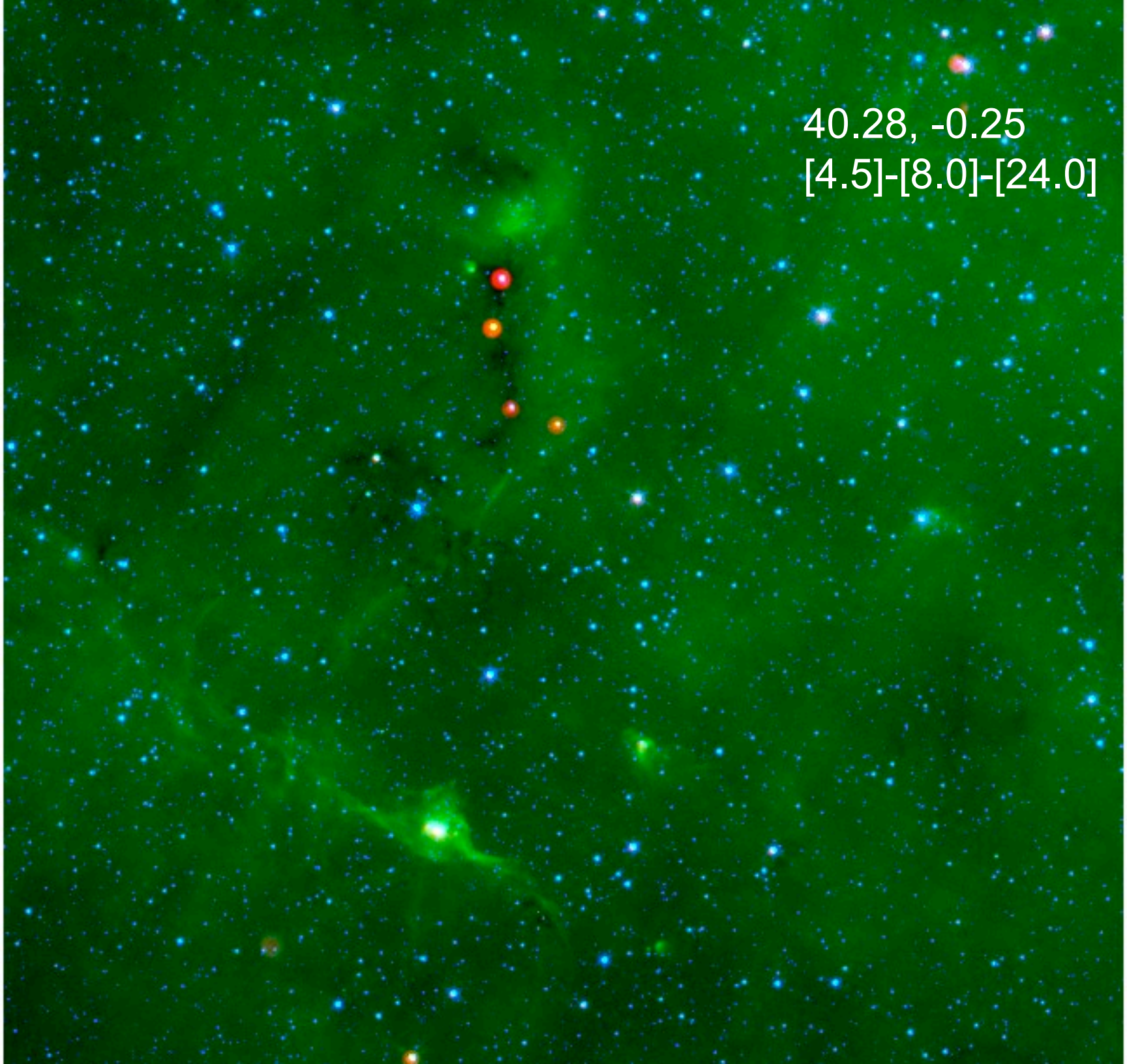
Green->stars with
3.6-8.0μm=0.6 -1.3m
and 3.6-4.6μm=0.2-0.7m

Blue-> stars with little or
no reddening



YSOs


14.2, -0.55
[4.5]-[8.0]-[24.0]

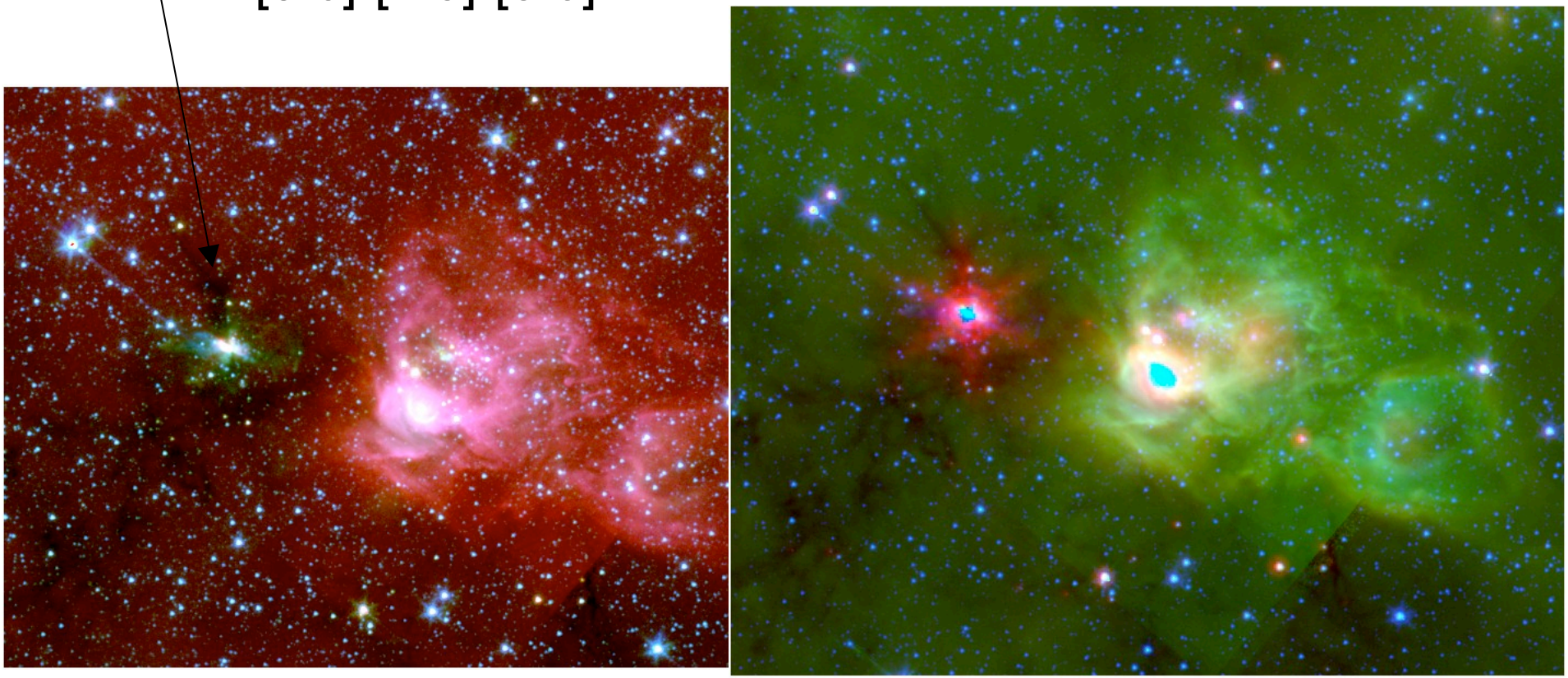

40.28, -0.25
[4.5]-[8.0]-[24.0]

G35.19-0.74

EGO

[3.6]-[4.5]-[8.0]

[4.5]-[8.0]-[24.0]

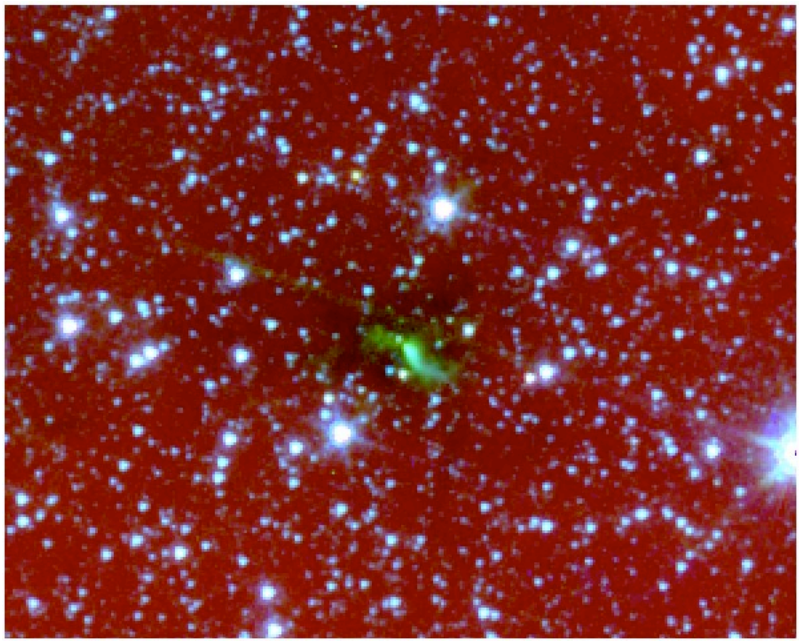


Early B protostar(s)?

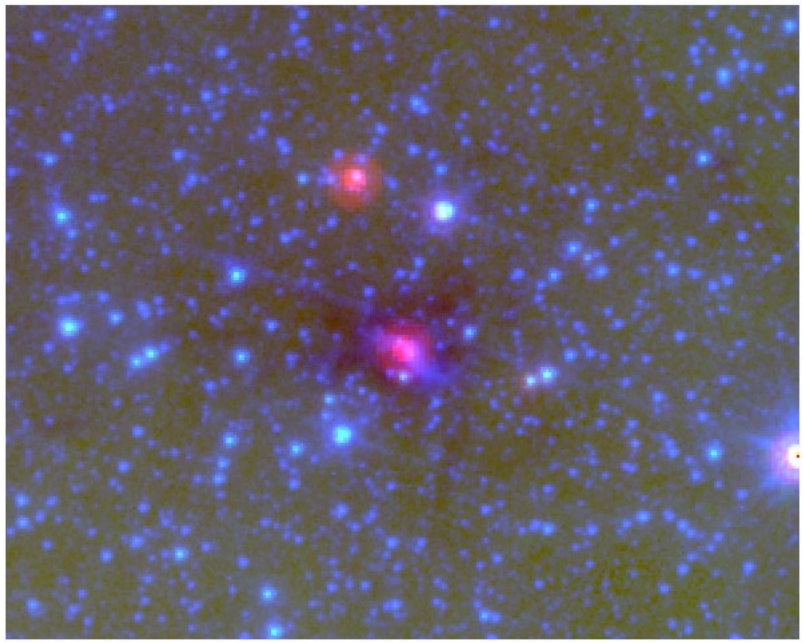
G324.72+0.34

EGO

[3.6]-[4.5]-[8.0]

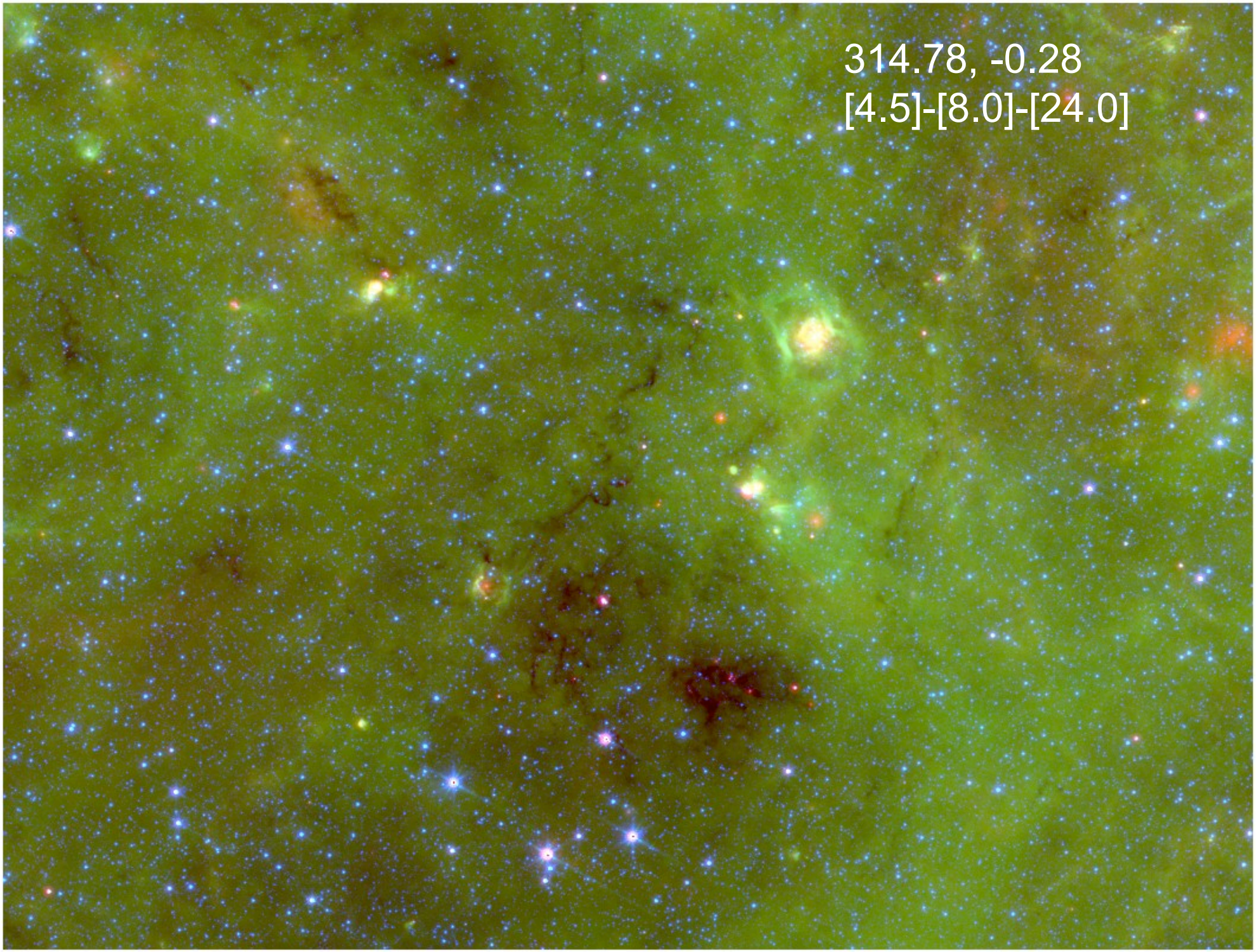


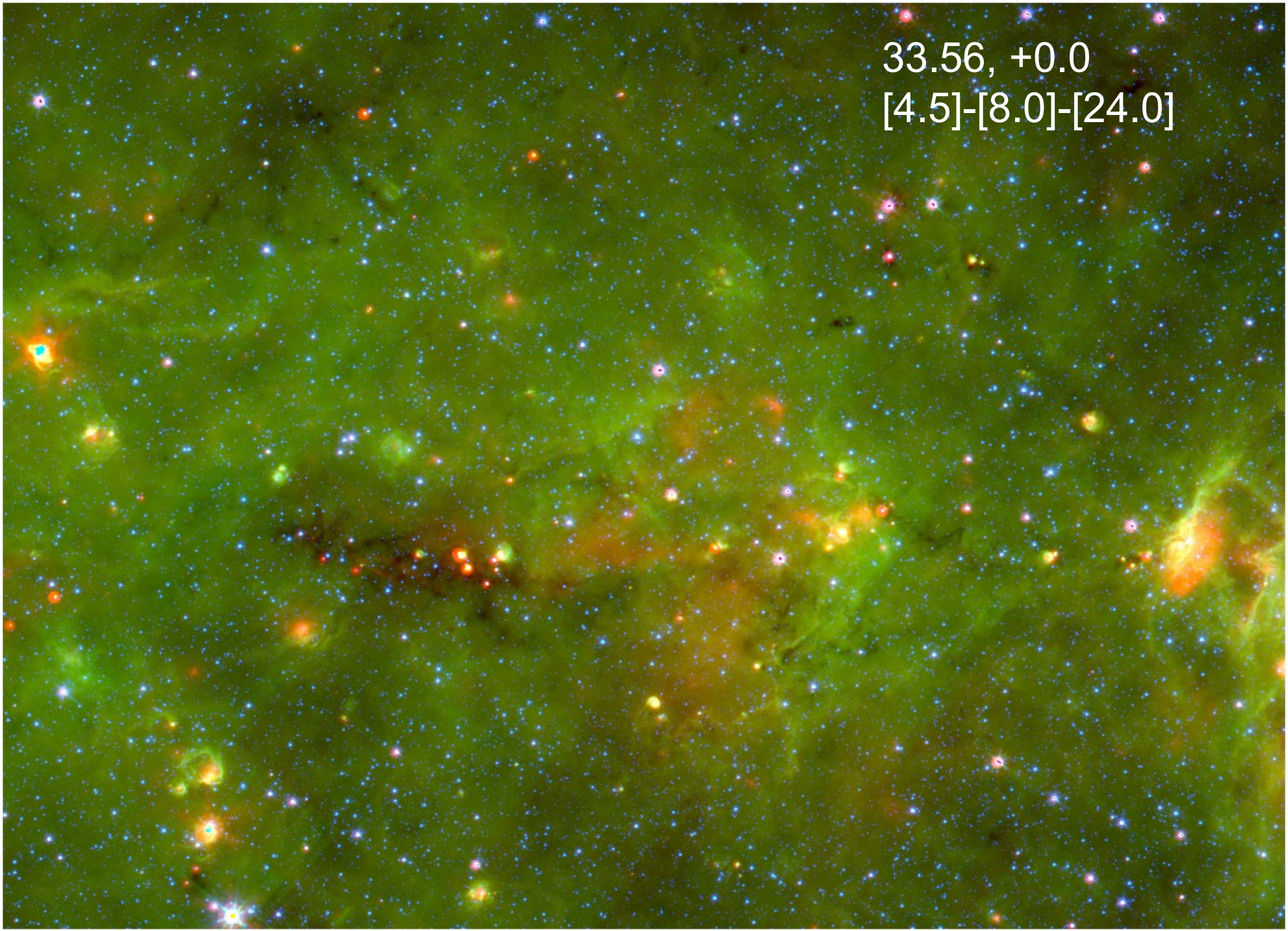
[4.5]-[8.0]-[24.0]



Isolated early protostar (intermediate mass)

Diffuse Dust/PAHs

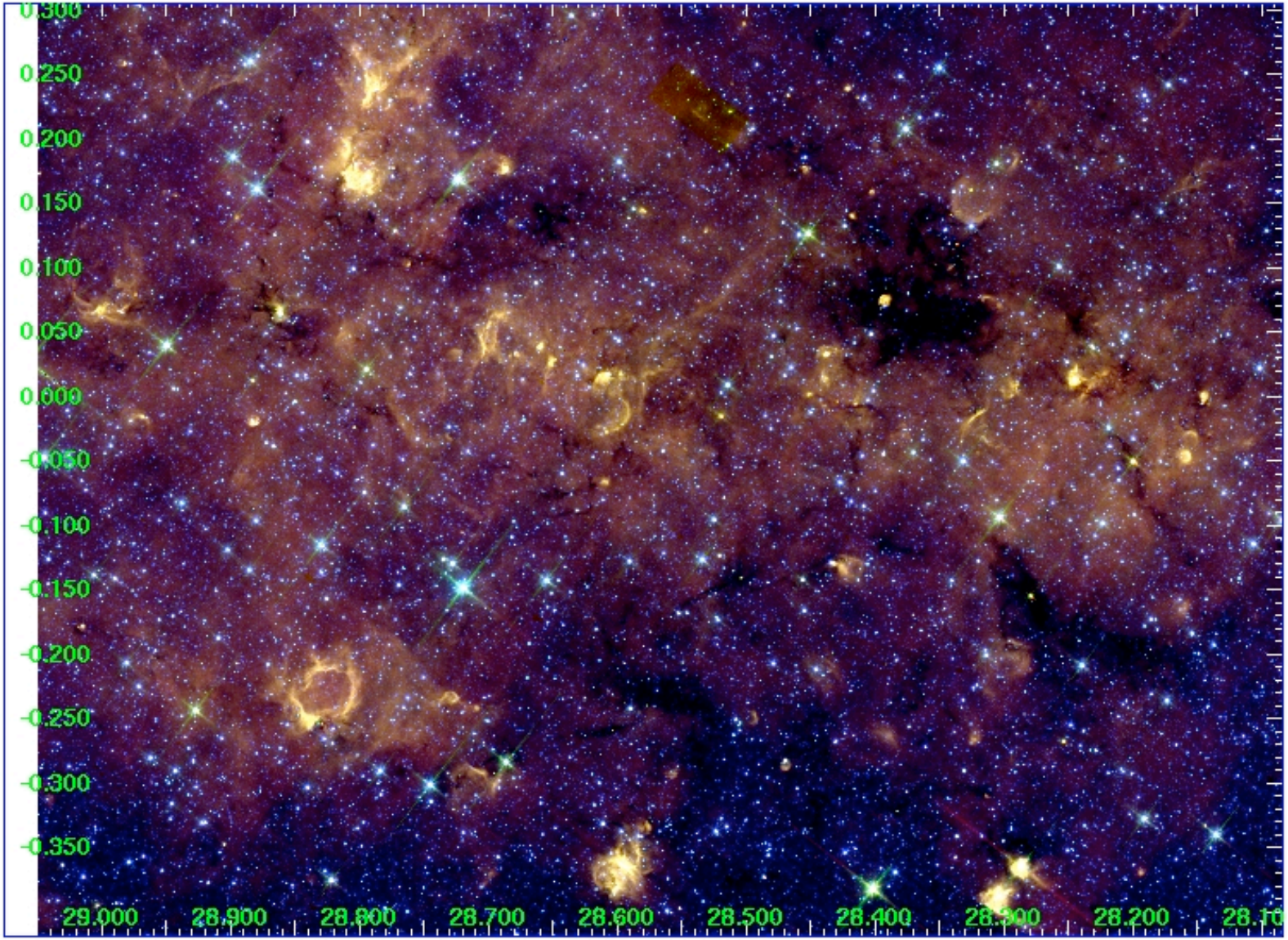

314.78, -0.28
[4.5]-[8.0]-[24.0]

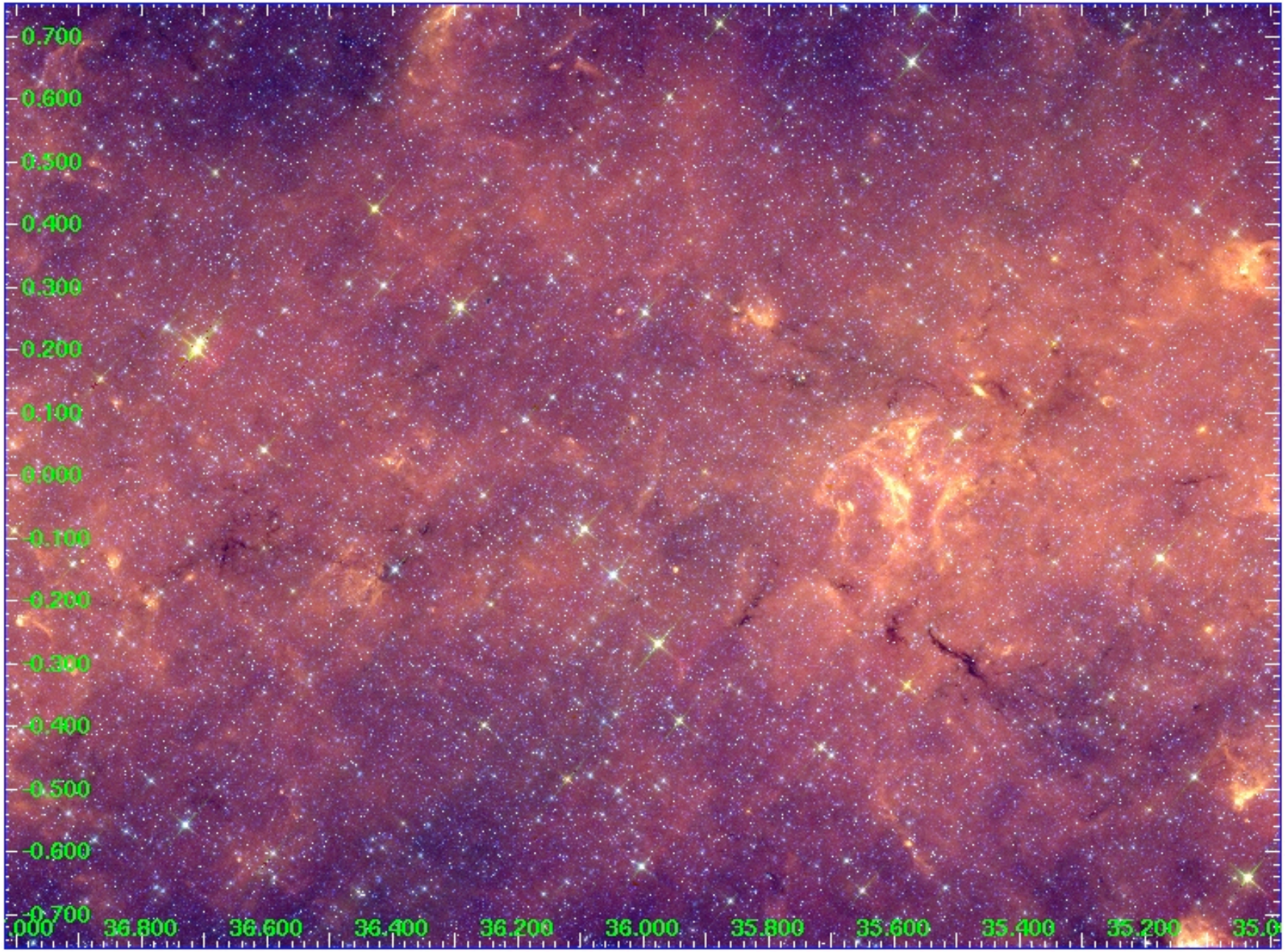

33.56, +0.0
[4.5]-[8.0]-[24.0]

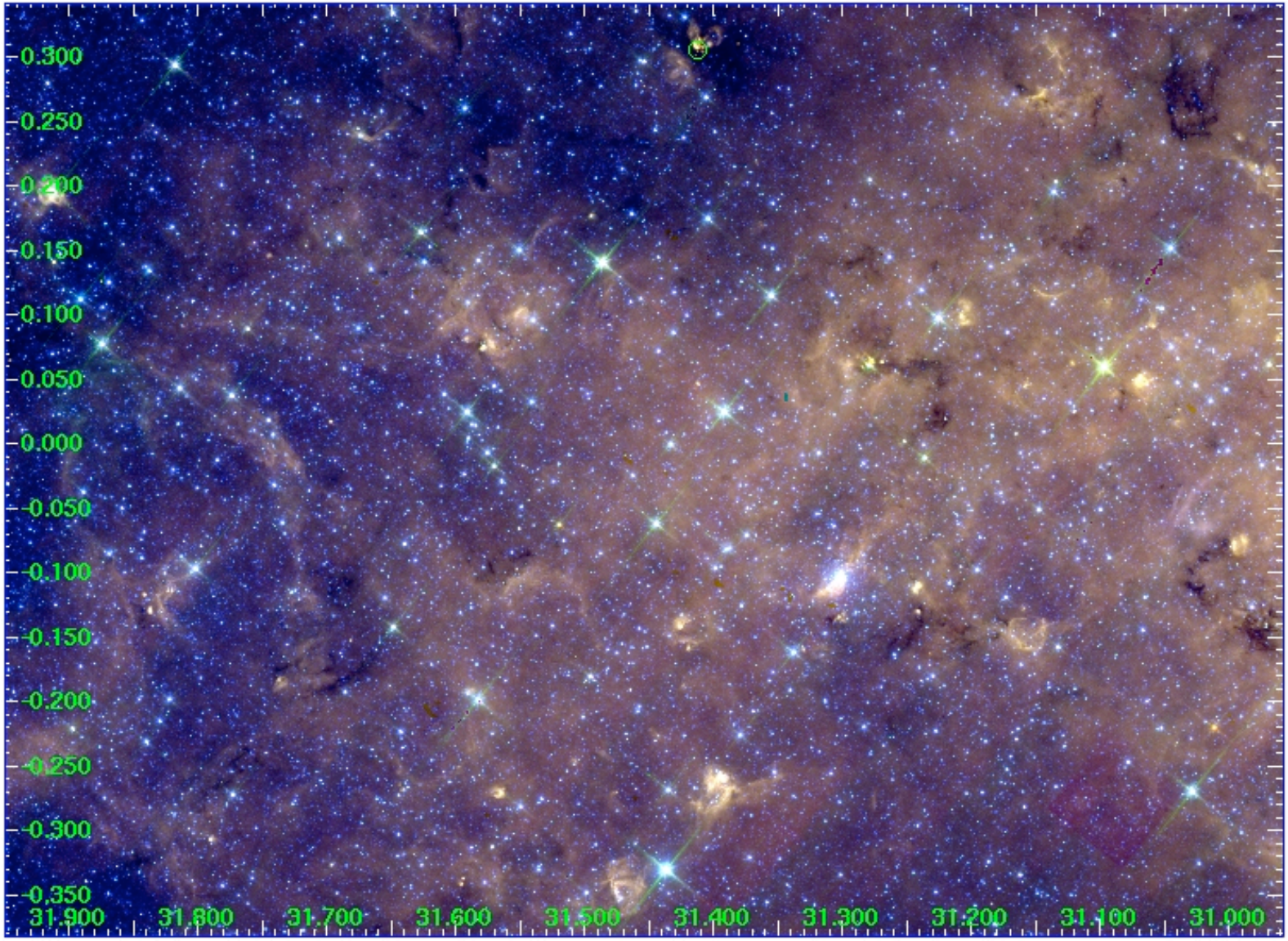
Stars

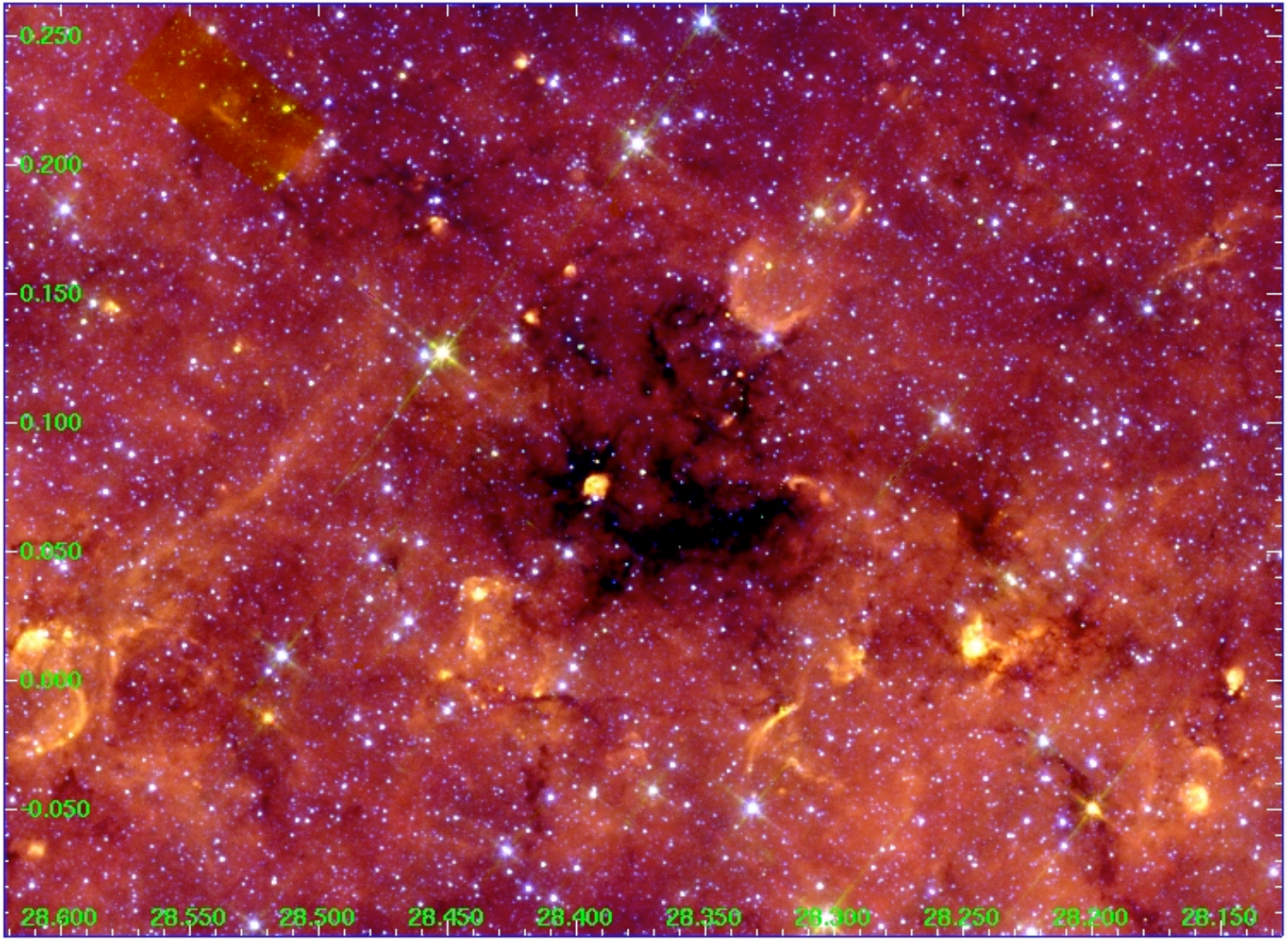
Over 10^8 (104 million) have been archived
in the Galactic Plane
~270,000 stars/sq deg
~75 stars/sq. arcmin
~0.02 stars/sq arcsec

With <2” resolution, confusion is not a serious problem over most of the Galactic plane!


0.300
0.250
0.200
0.150
0.100
0.050
0.000
-0.050
-0.100
-0.150
-0.200
-0.250
-0.300
-0.350
29.000
28.900
28.800
28.700
28.600
28.500
28.400
28.300
28.200


0.700
0.600
0.500
0.400
0.300
0.200
0.100
0.000
-0.100
-0.200
-0.300
-0.400
-0.500
-0.600
-0.700
.000
36.800
36.600
36.400
36.200
36.000
35.800
35.600
35.400
35.200
35.0


0.300
0.250
0.200
0.150
0.100
0.050
0.000
-0.050
-0.100
-0.150
-0.200
-0.250
-0.300
-0.350
31.900
31.800
31.700
31.600
31.500
31.400
31.300
31.200
31.100
31.000


0.250
0.200
0.150
0.100
0.050
0.000
-0.050
28.600
28.550
28.500
28.450
28.400
28.350
28.300
28.250
28.200
28.150

Summary

- I have mentioned a small fraction of the interesting science that is being worked on using the GLIMPSE/MIPSGAL surveys.
- A lot of effort is being invested in understanding the impact of dust in HII regions, the impact of expanding HII regions on the ISM, and the nature of diffuse dust & PAHs
- IRDCs are being intensively studied by several groups at radio and IR wavelengths
- The Mid-IR is a sensitive tracer of YSOs in the Galactic plane and has motivated numerous avenues of further research
- The distribution of red clump giants has been instrumental in illuminating large scale Galactic structure (the Galactic Bar, spiral tangencies or lack thereof, the stellar scale length).
- At least 6 PhD theses (probably more that I am not aware of) have been based on GLIMPSE/MIPSGAL data and well over 150 refereed papers.