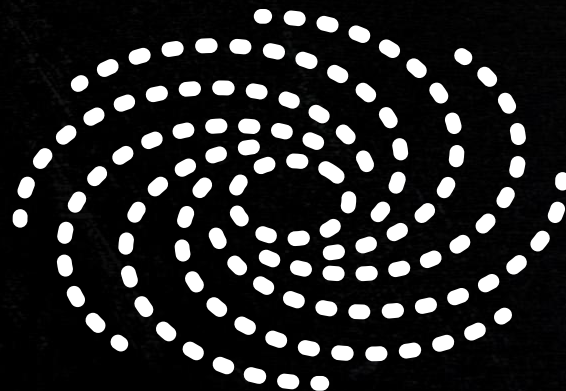


-ACES-


BOSTON 



Savannah Gramze
PhD Student at the University of Florida
Advisor - Adam Ginsburg



Topics



Star Formation in the Dust Ridge

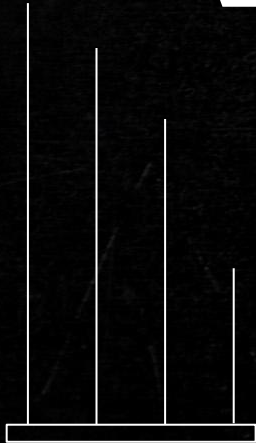
How does star formation
progress as gas orbits the
Galactic Center?

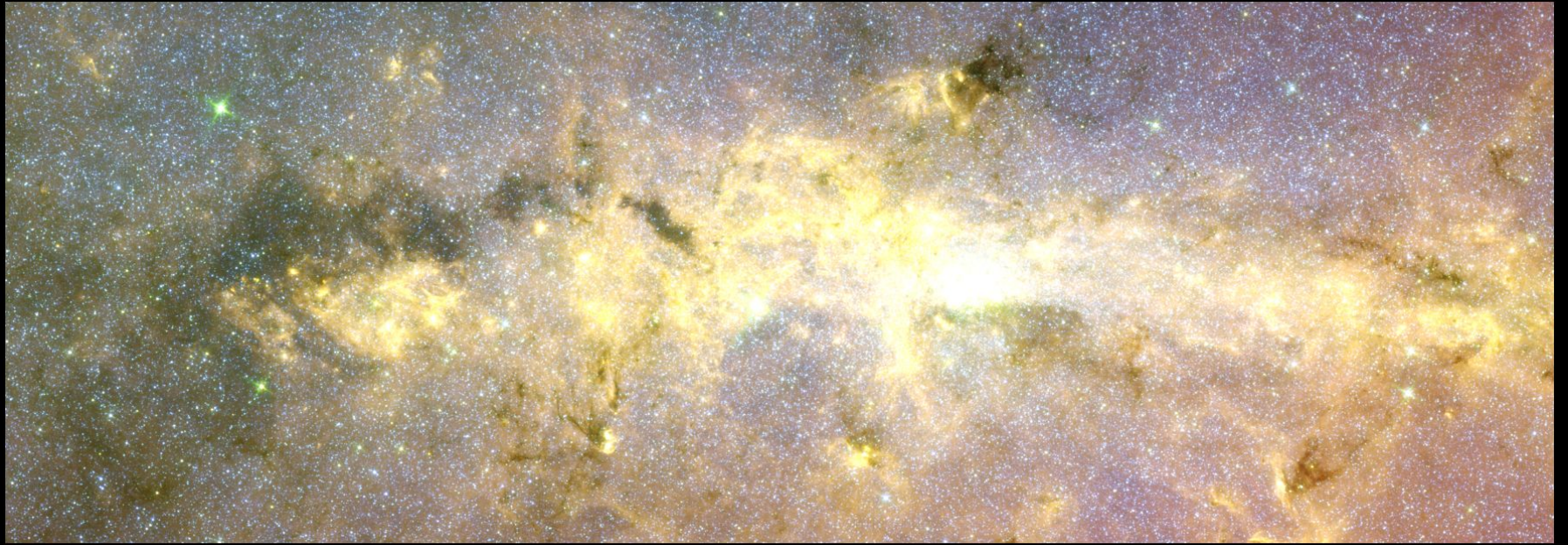


Line of Sight Confusion in ACES

How much of the star formation
and gas we see in ACES is not in
the Galactic Center?

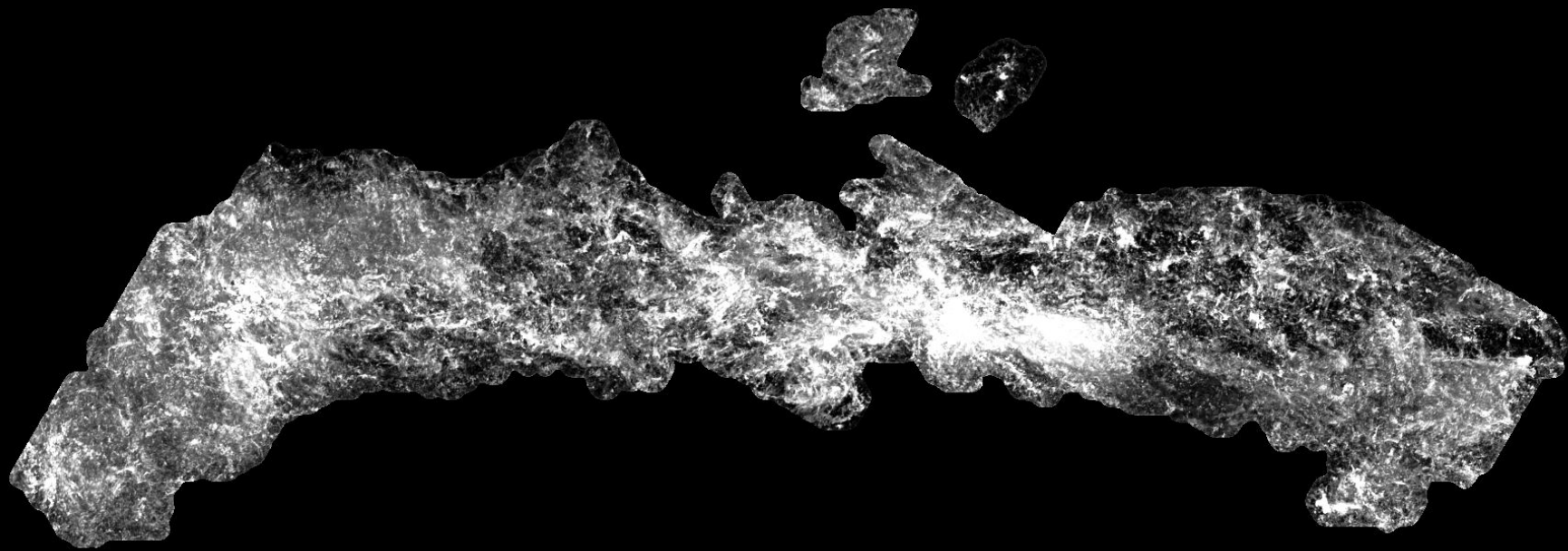
Let's Start With Some Data



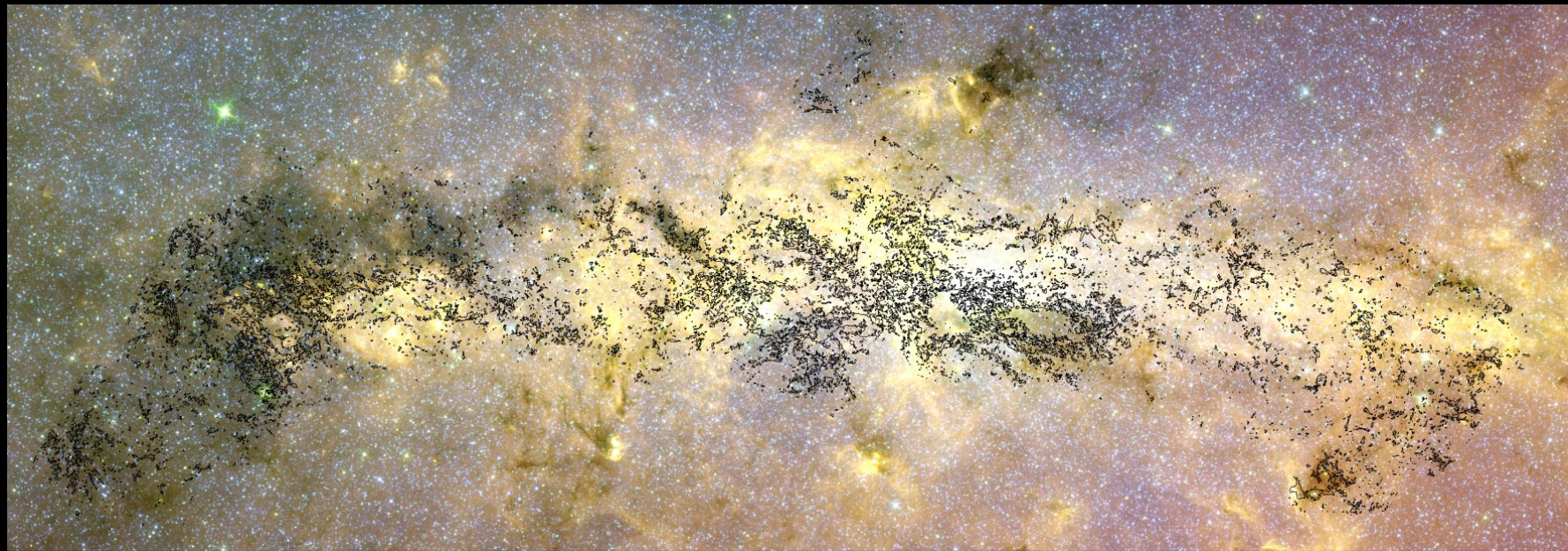


Galactic Center with Spitzer



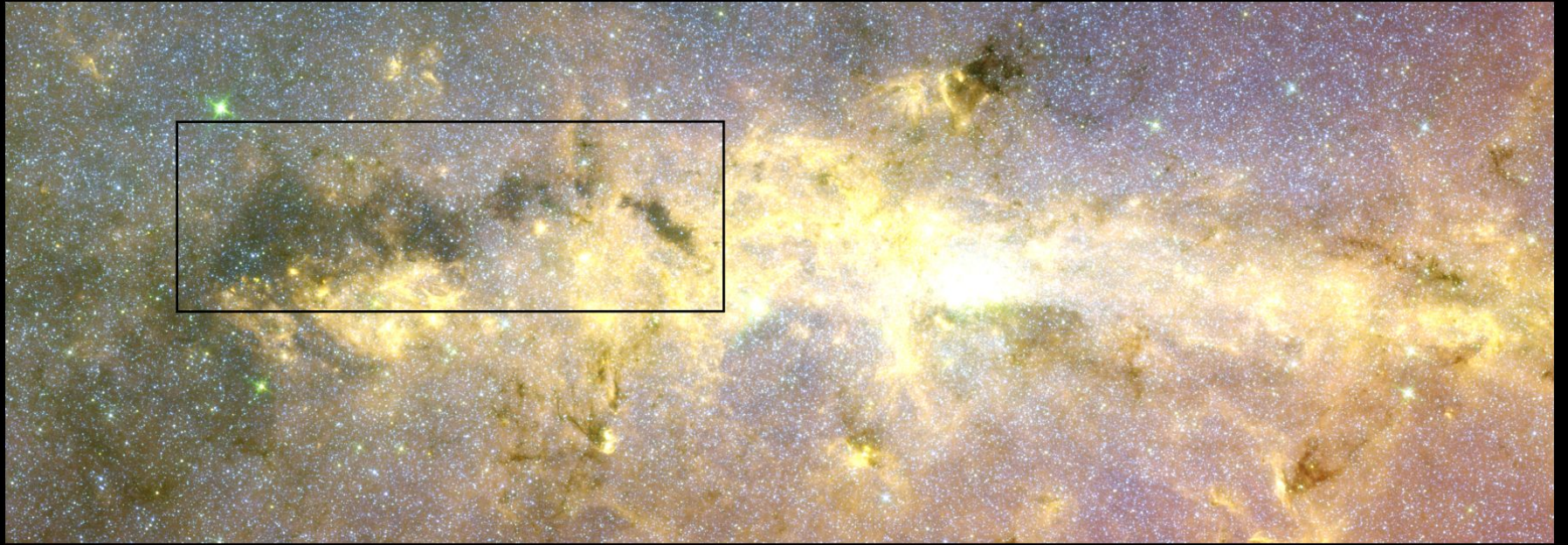


CS 2-1



Spitzer + CS 2-1





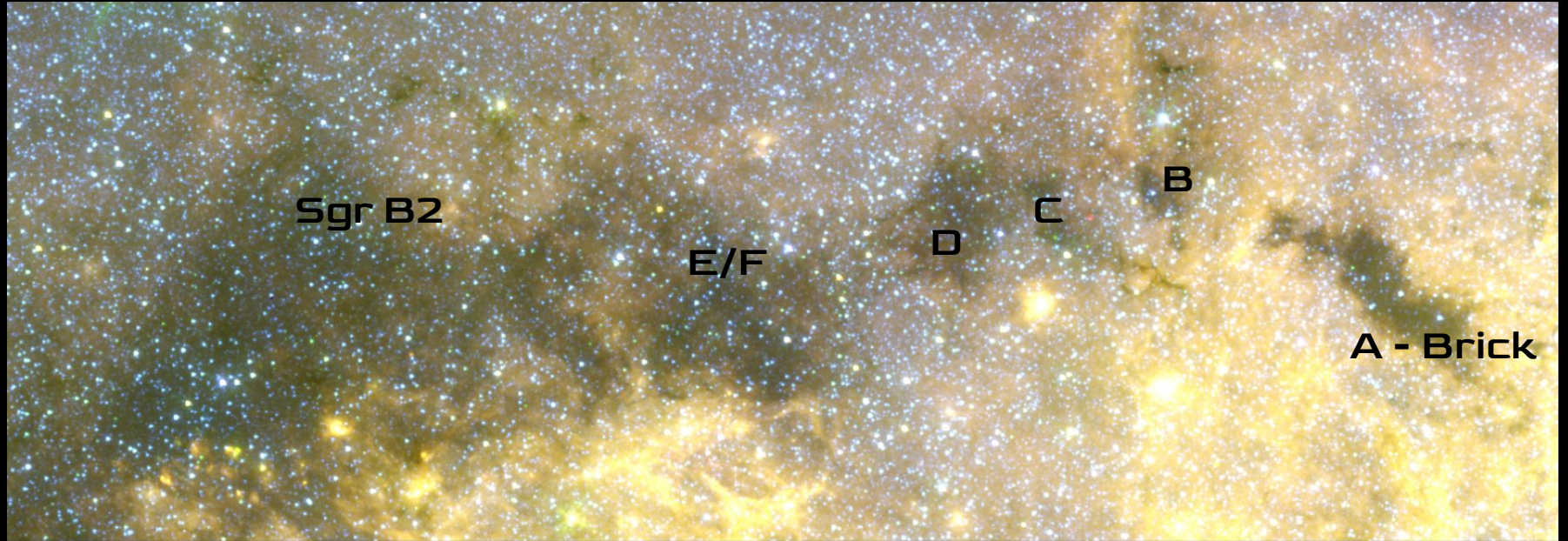
The Dust Ridge





The Dust Ridge





Sgr B2

E/F

D

C

B

A - Brick

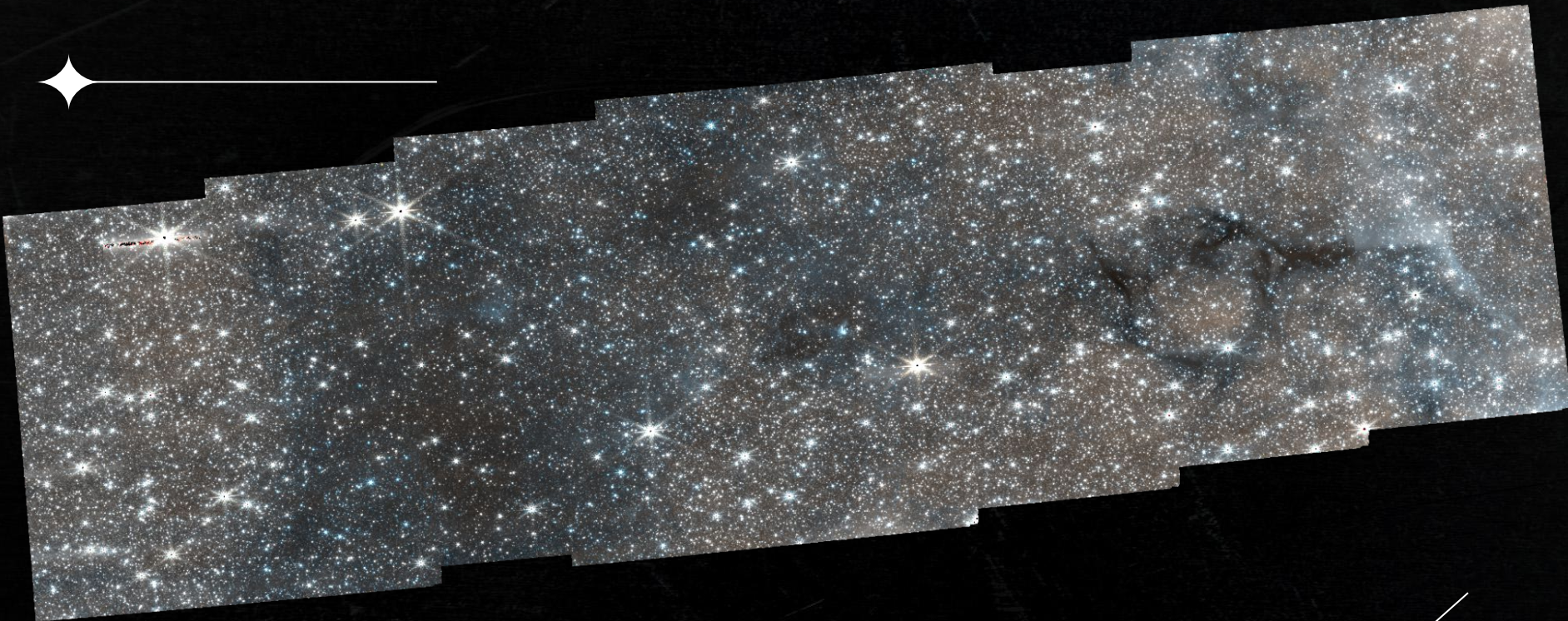
The Dust Ridge

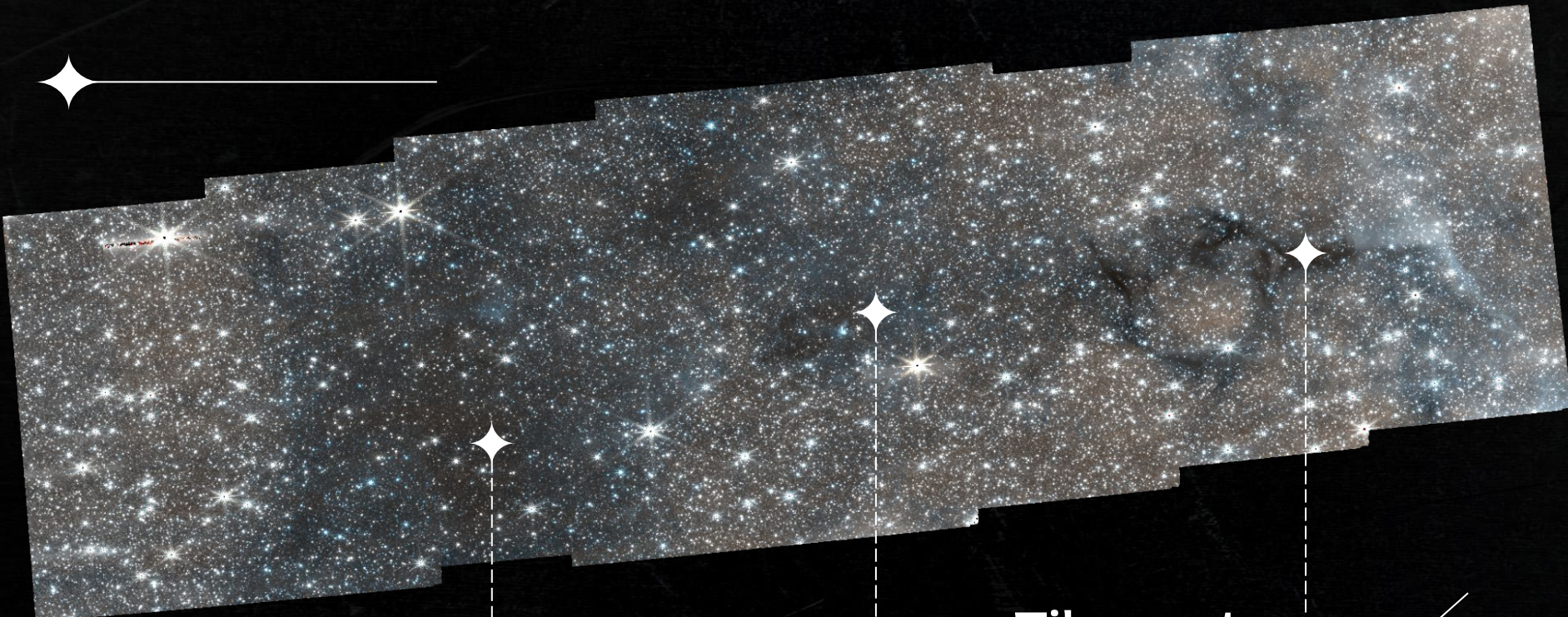




JWST NIRCam FOV







Cloud D

Cloud with no known
Star Formation

Cloud C

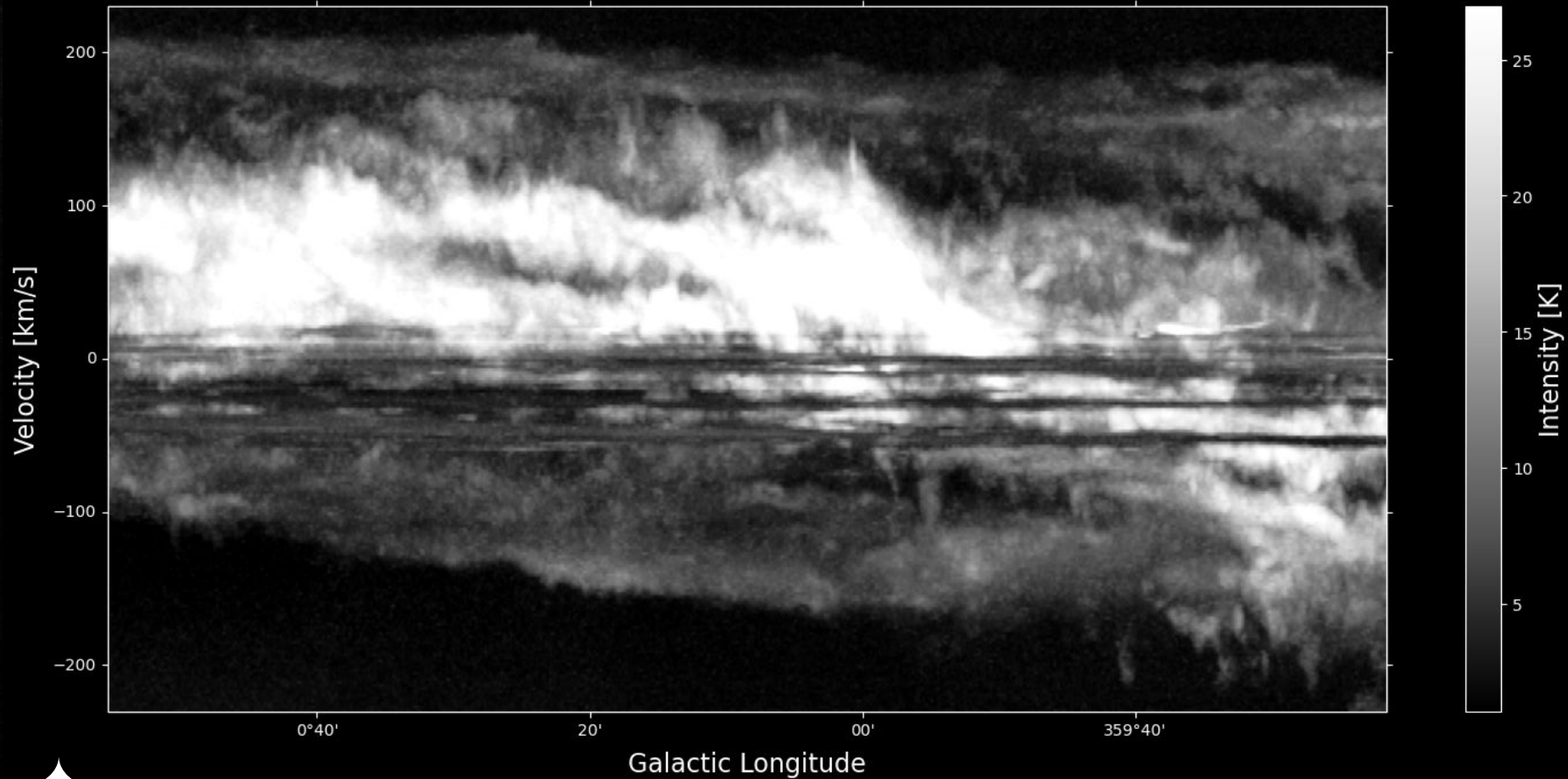
Site of High Mass
Star Formation

Filament

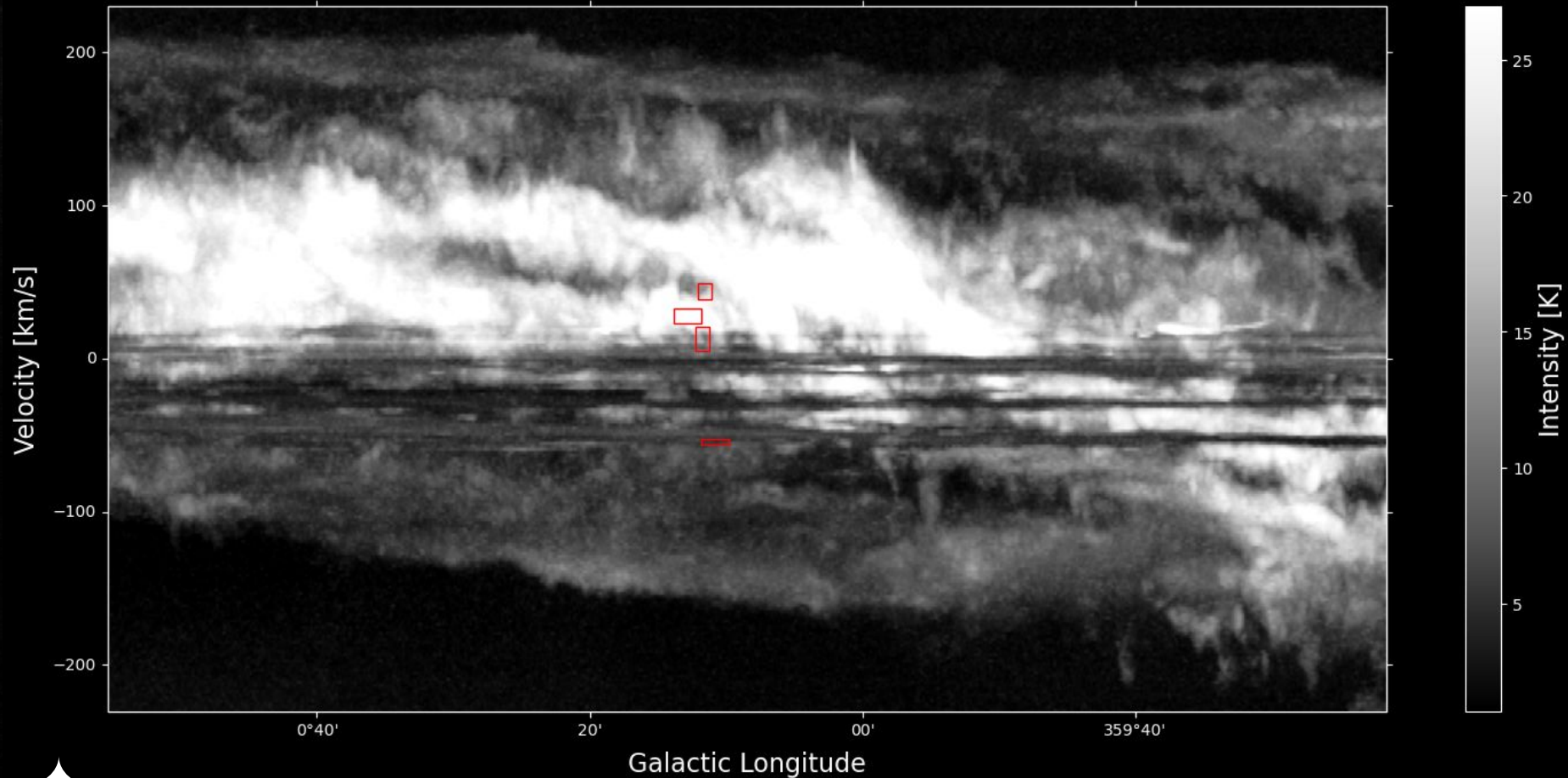
Star Forming gas in
the 3kpc arm

- Large scale context
- CS PV diagram ✓
 - Make rgb with CO? X
- ACES CS moment map ✓
- BEARS CO large scale mom0? - more for the filament ✓
- Where the dust ridge is in the CMZ and where I'm pointing ✓
- Spitzer to show where the dust ridge is ✓
- Have every ACES molecule as an overlay as backup slides ✓
 - Mom0 maps
 - Pv diagrams
- SiO masers and Webb sources
 - Show MIRI+NIRCam images with SiO maser catalog overlaid, confirm they are all stars
- Lots of backup slides!!

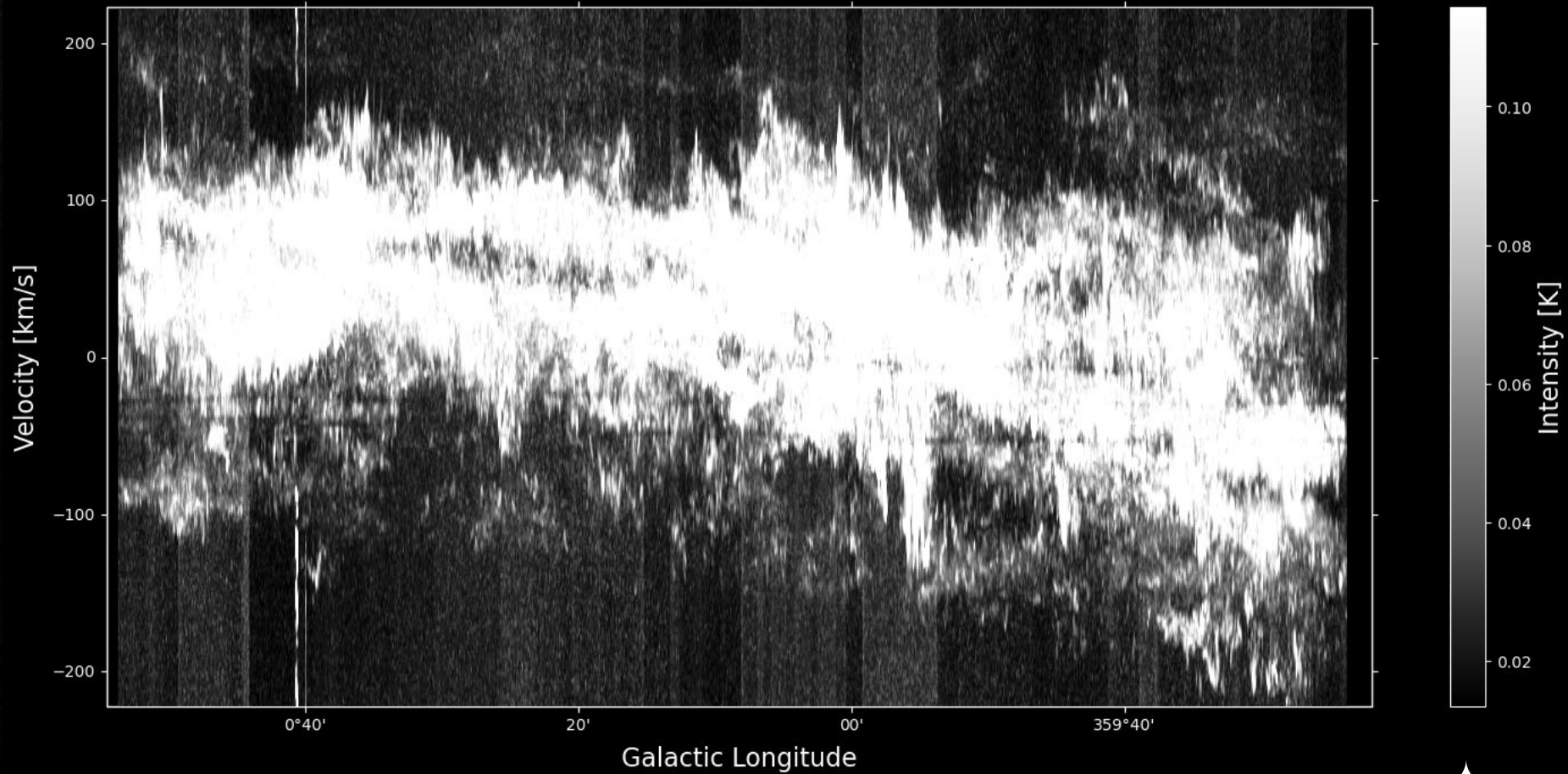
$^{12}\text{CO } 1-0$



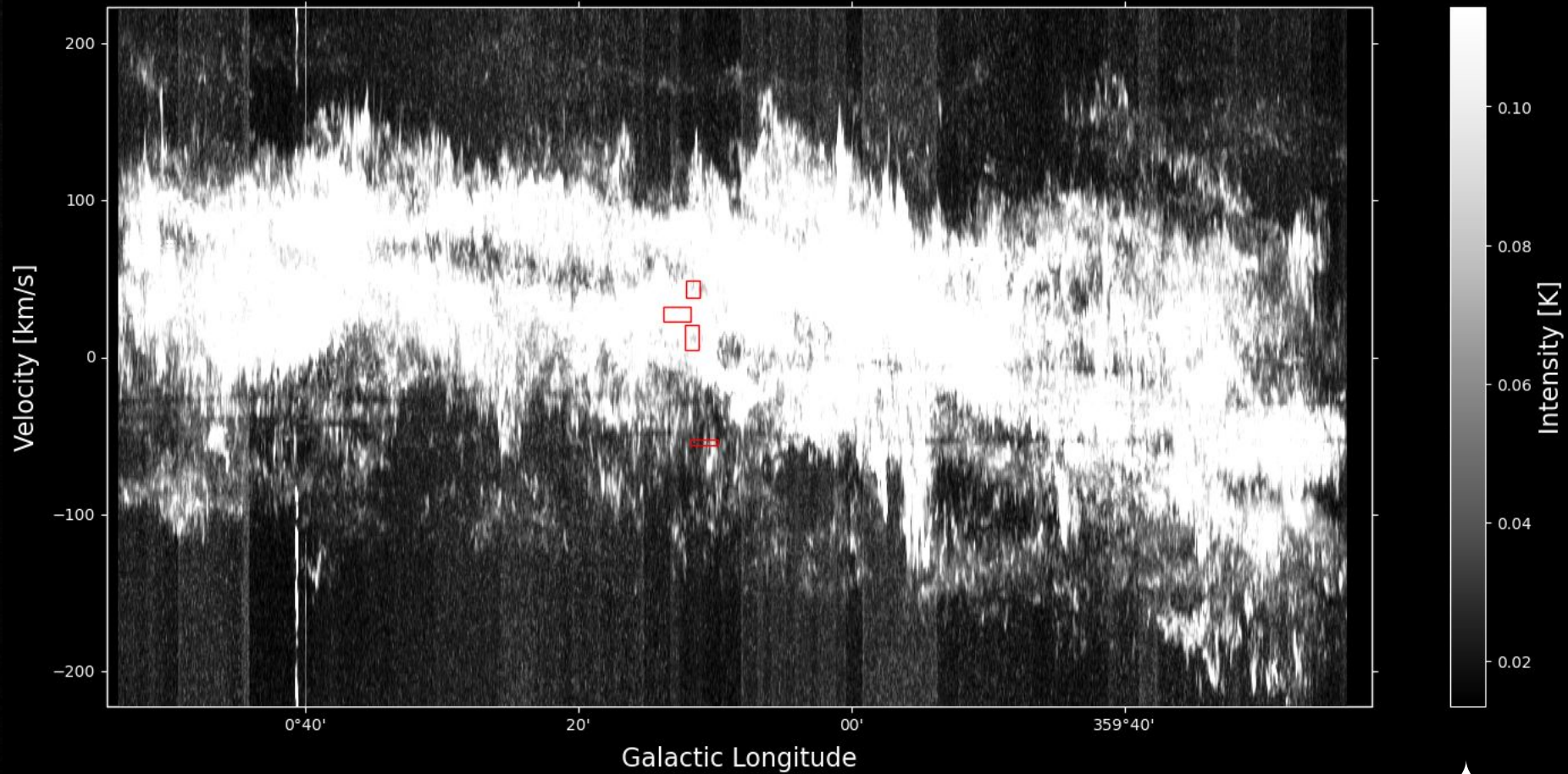
$^{12}\text{CO 1-0}$



CS 2-1



CS 2-1



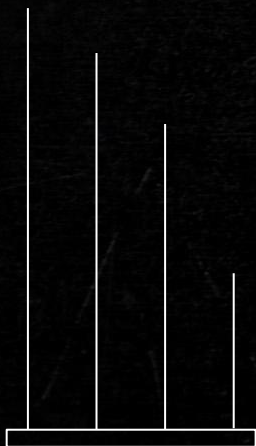
Dust Ridge Cloud D

Star Forming Status: None
(known)



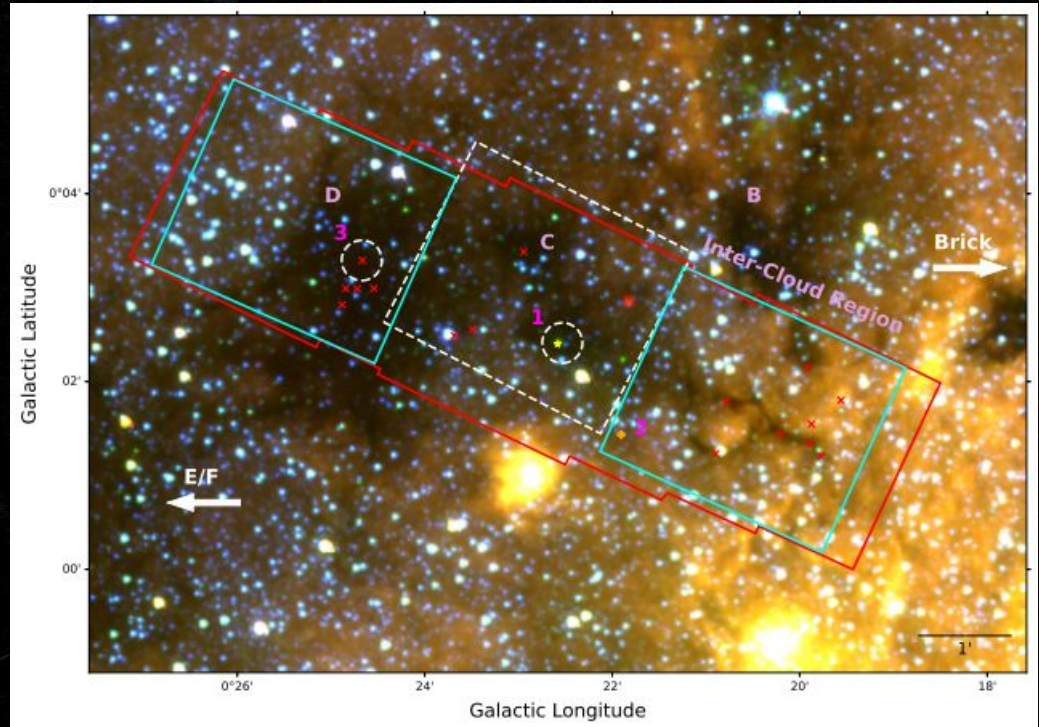
Data Pending...

- ★ ALMA Proposal covering Cloud D in Band 6 was accepted with C rank!
- ★ Goal: Search for signs of low mass star formation in Cloud D and Inter-Cloud Region



Data Pending...

- ★ ALMA Proposal covering Cloud D in Band 6 was accepted with C rank!
- ★ Goal: Search for signs of low mass star formation in Cloud D and Inter-Cloud Region





Dust Ridge Cloud C

Star Forming Status: Massive
Components: Two

Declination

$-28^{\circ}35'10''$

20''

30''

40''

50''

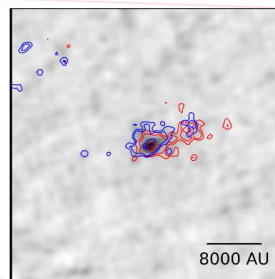
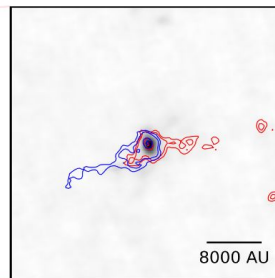
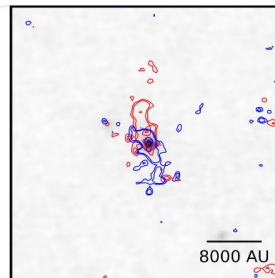
$17^{\text{h}}46^{\text{m}}23^{\text{s}}$

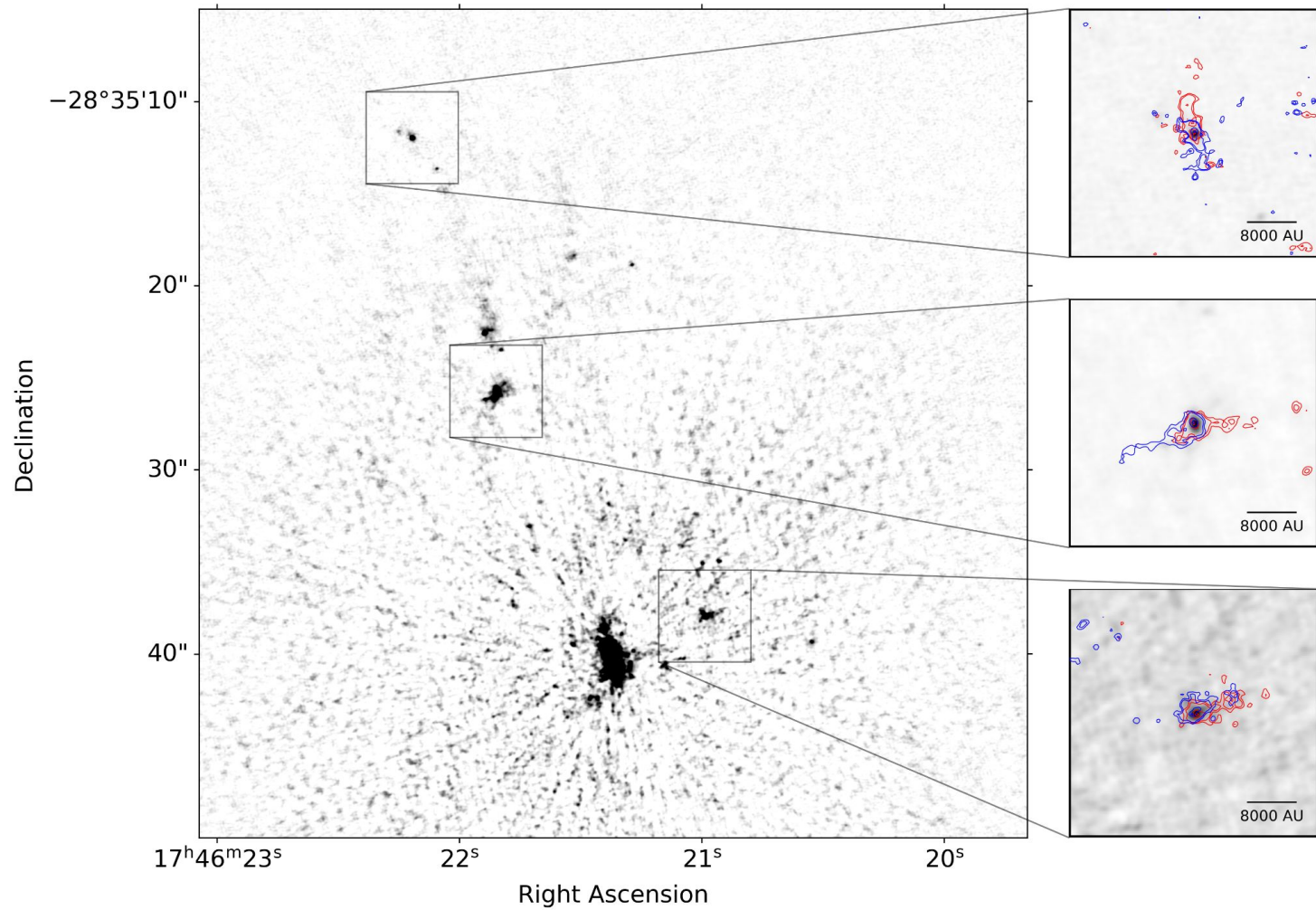
22^{s}

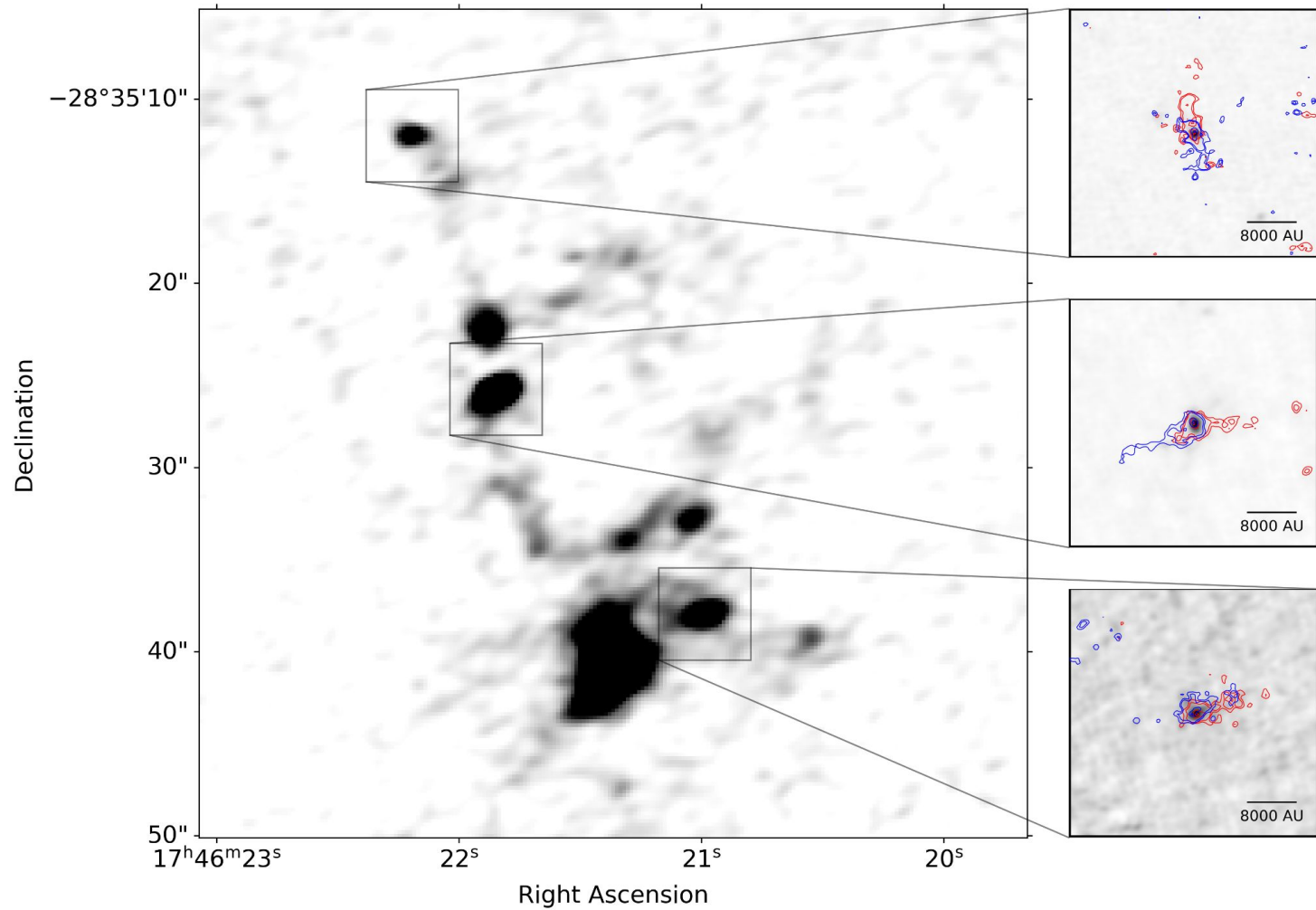
21^{s}

20^{s}

Right Ascension

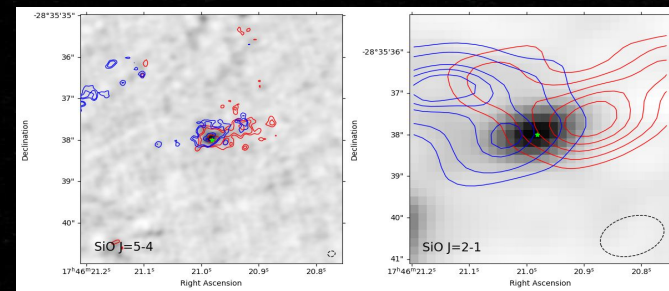
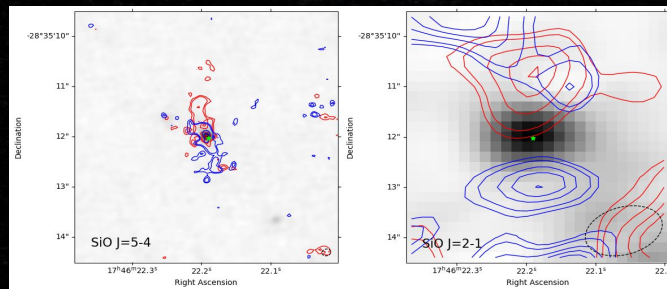
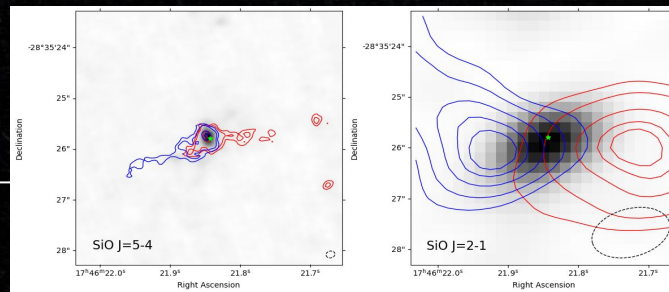






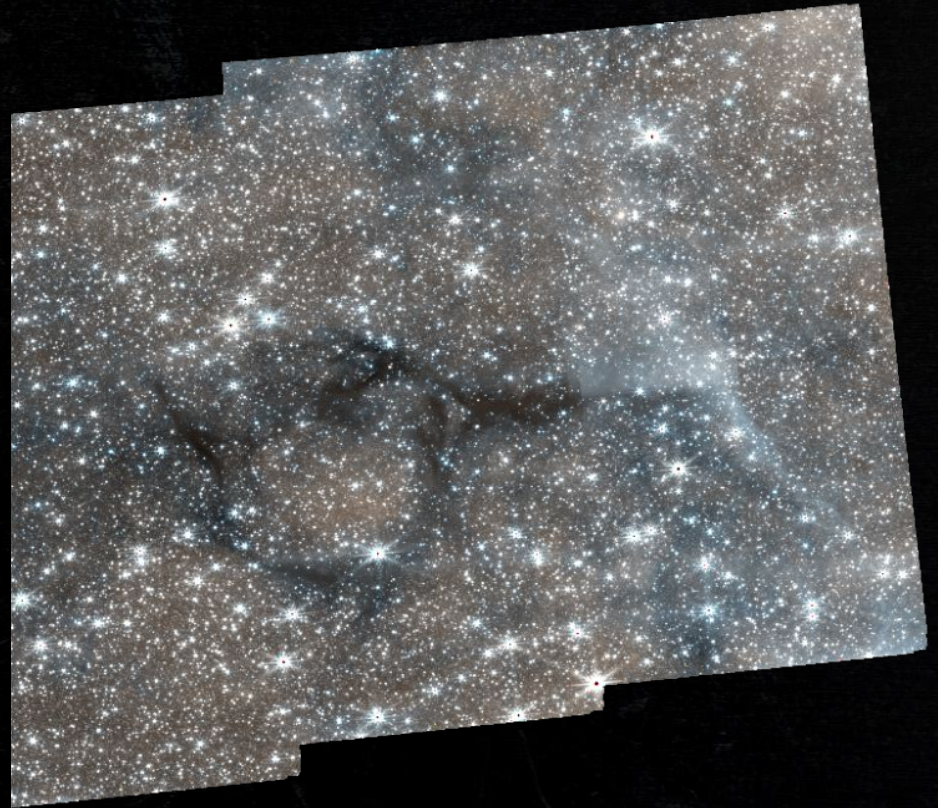
Cloud C Outflows

- ★ ACES has several lines which act as outflow tracers
- ★ We can see correlations between ACES outflow traces and outflow features in more resolved data.



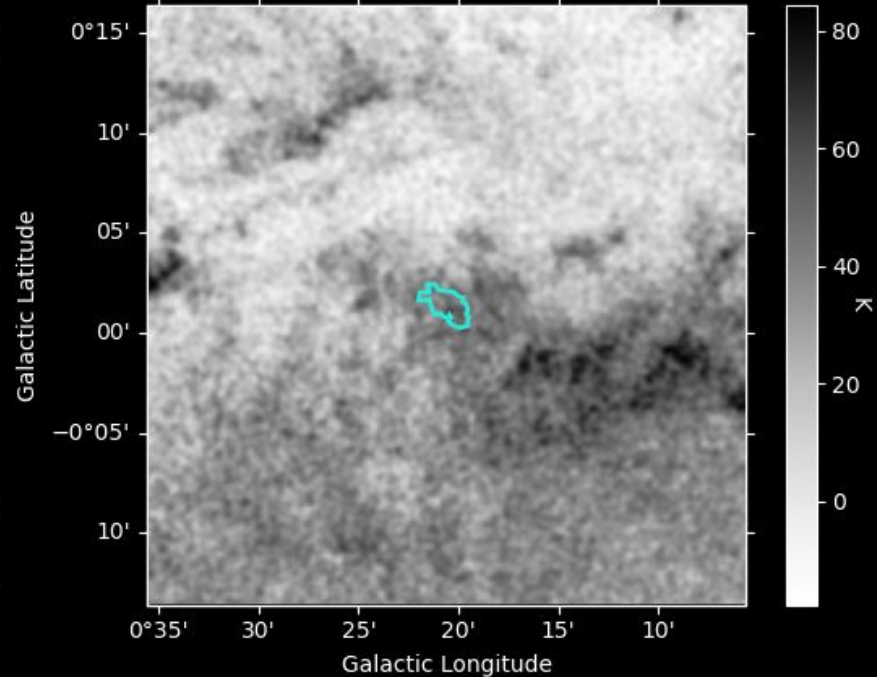
Star-Forming Filament

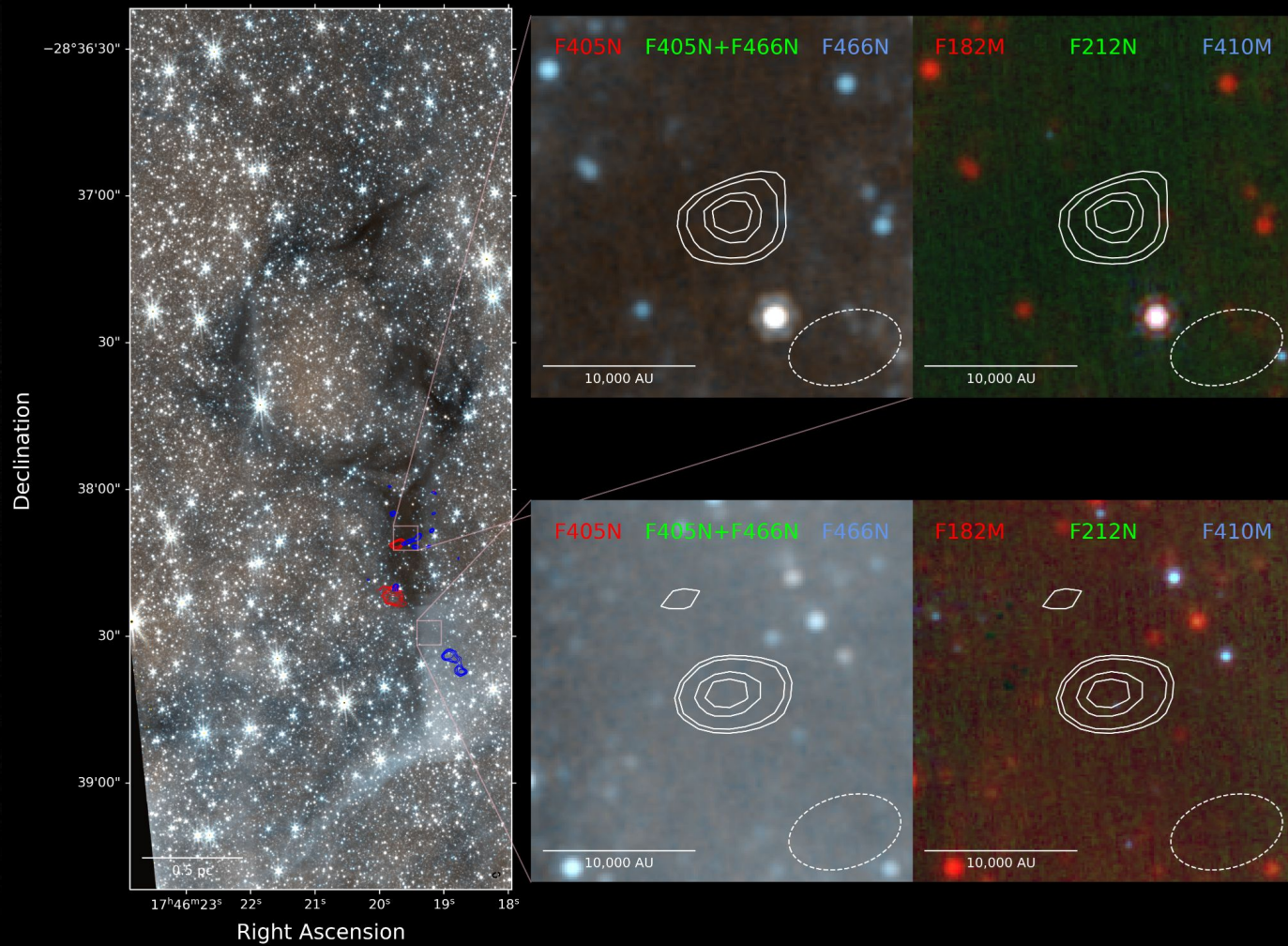
Location: 3kpc arm
Outflows: Two



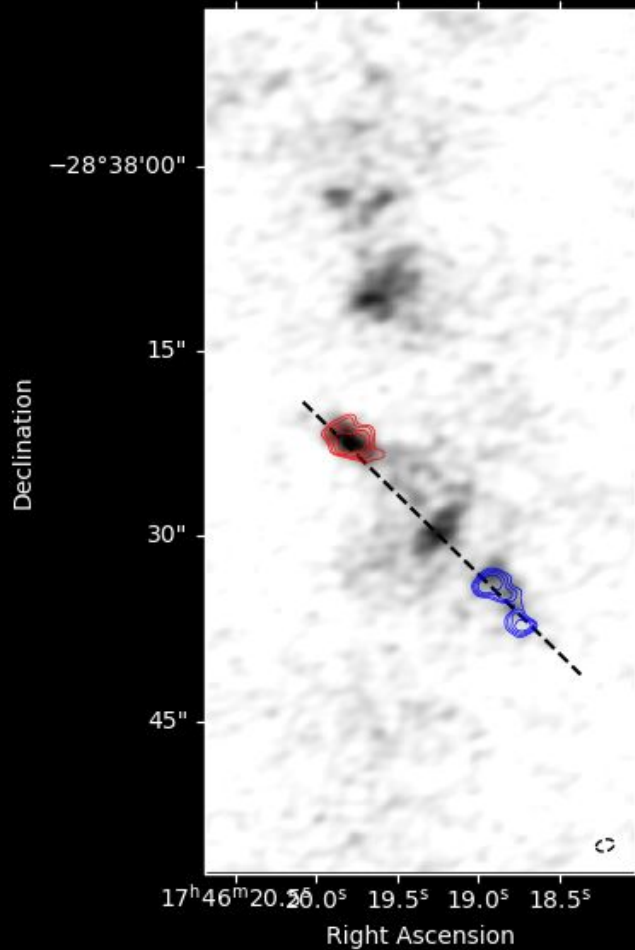
Star-Forming Filament

- ★ Embedded in a larger cloud of CO
- ★ ^{12}CO does not trace the filament structure
- ★ Two protostellar cores identified with ACES data
 - Continuum
 - And outflows!
- ★ Located in the 3kpc arm
- ★ How much star formation in ACES is located outside of the CMZ?

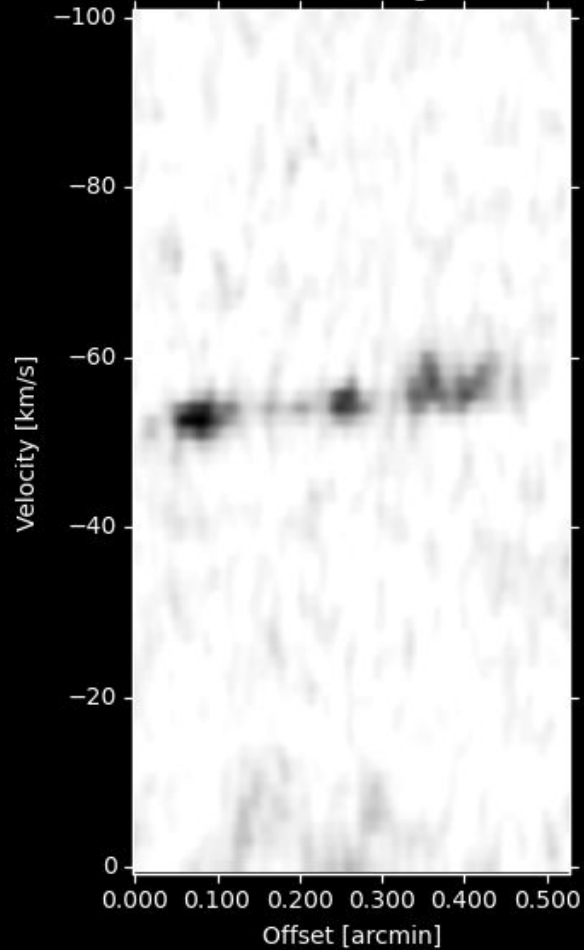




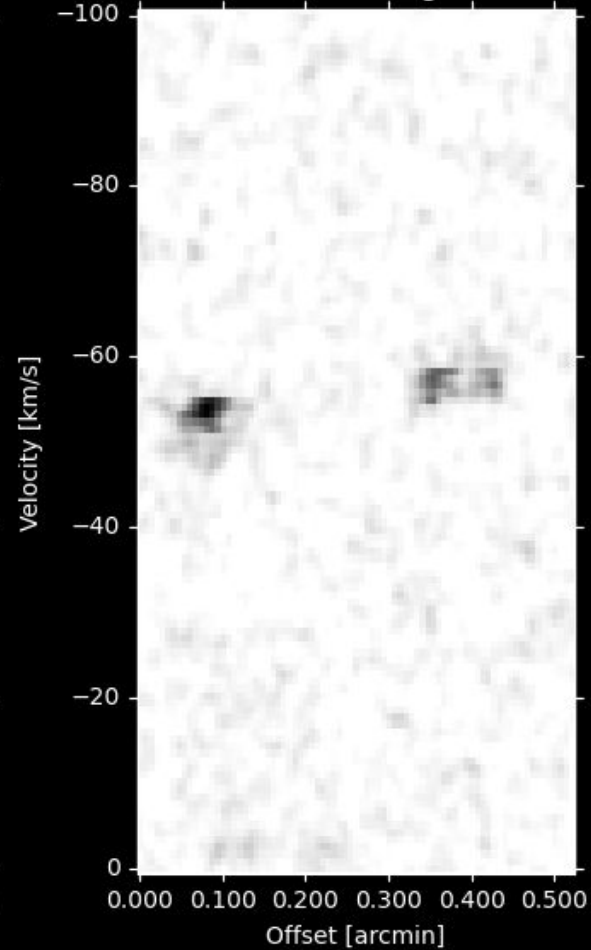
CS 2-1 Mom0



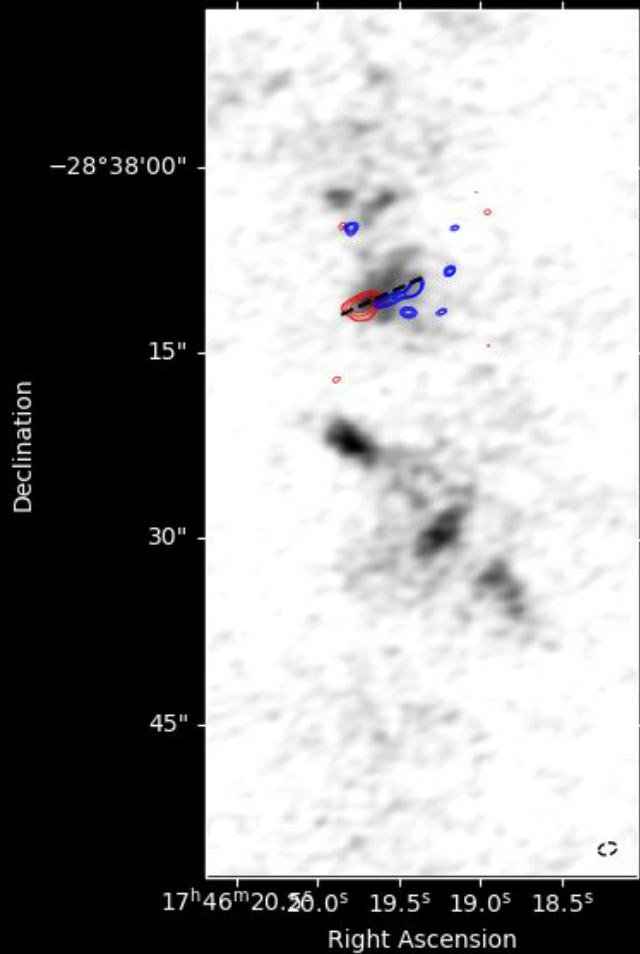
CS 2-1 PV Diagram



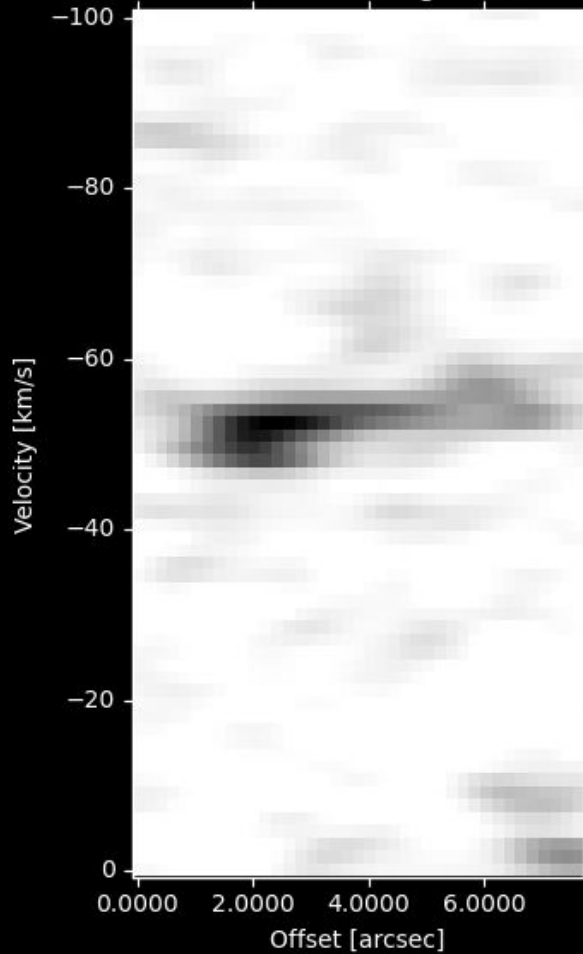
SiO 2-1 PV Diagram



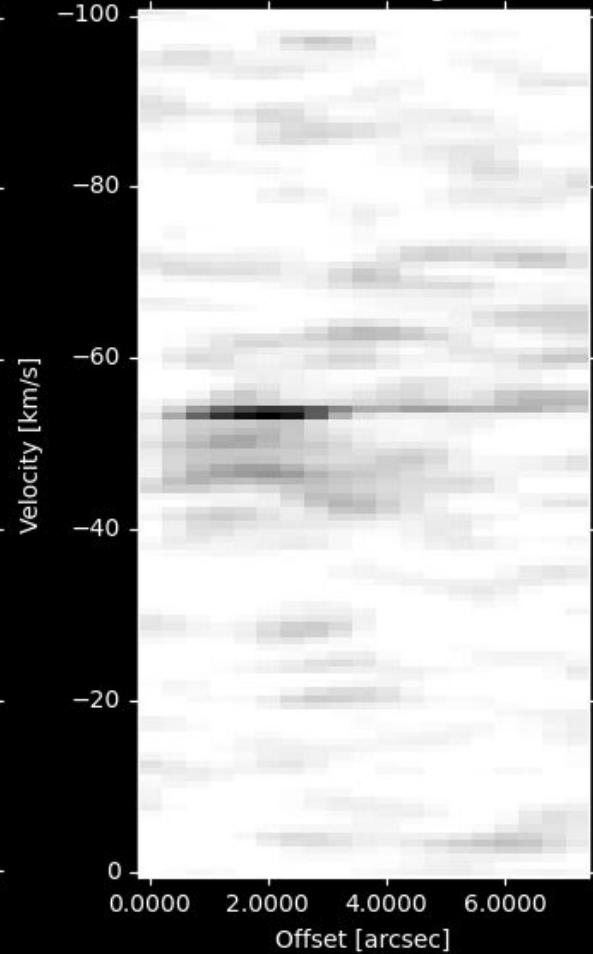
CS 2-1 Mom0

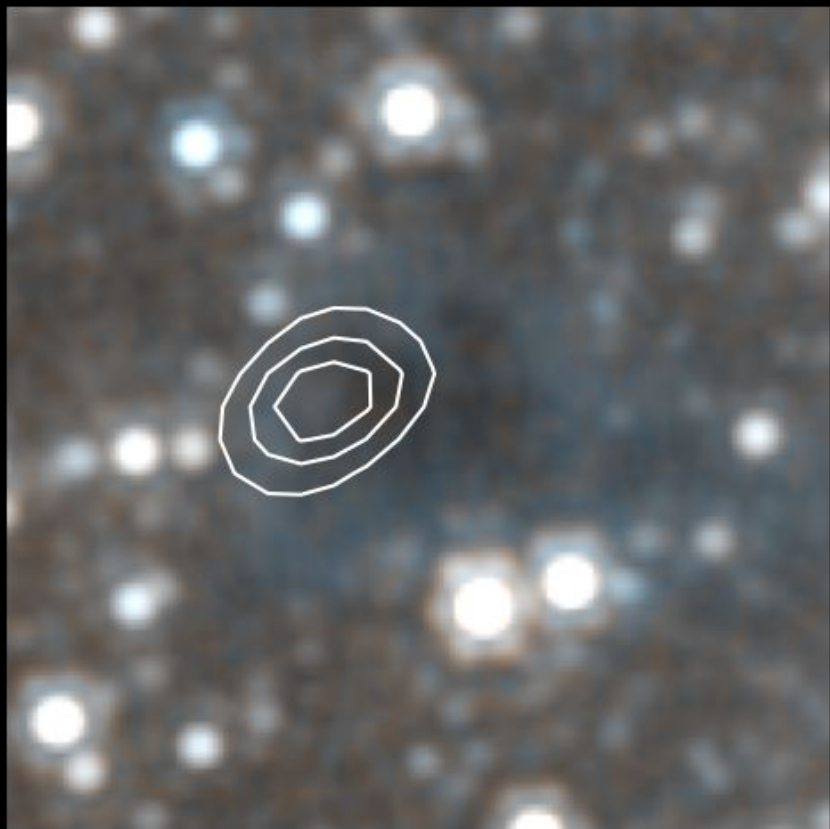


CS 2-1 PV Diagram



SiO 2-1 PV Diagram

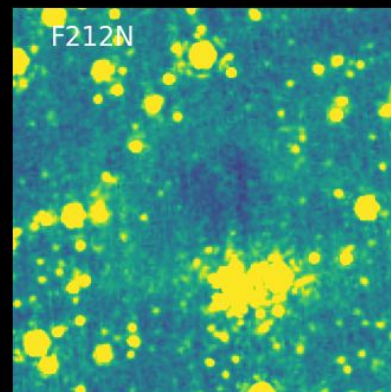
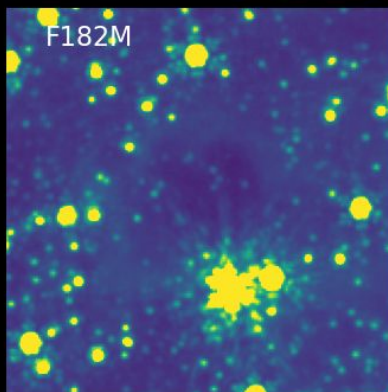
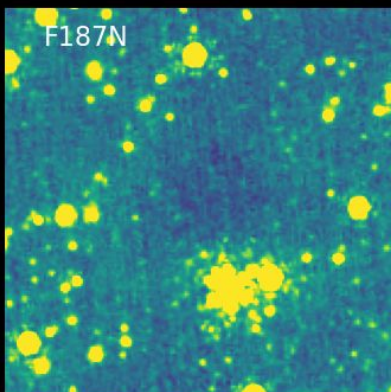
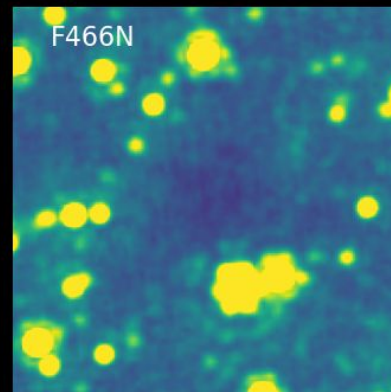
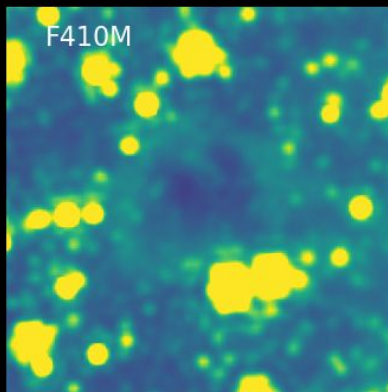
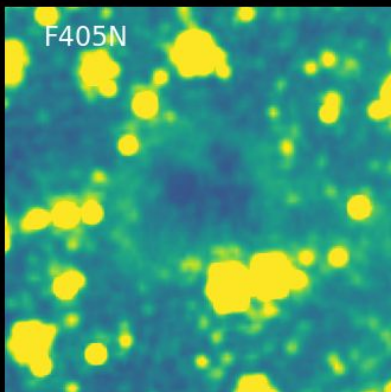


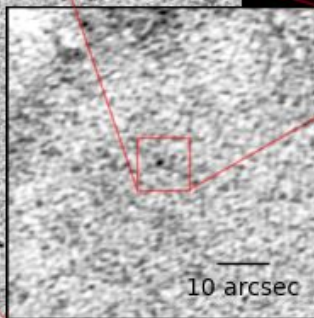
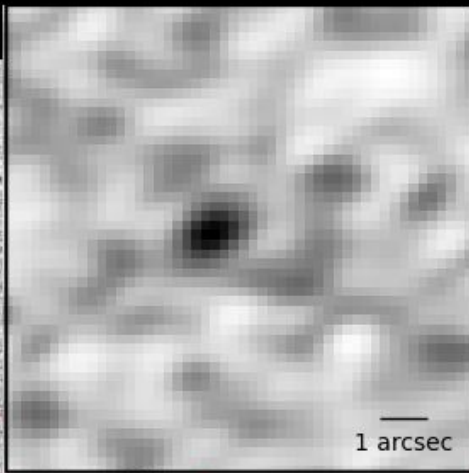
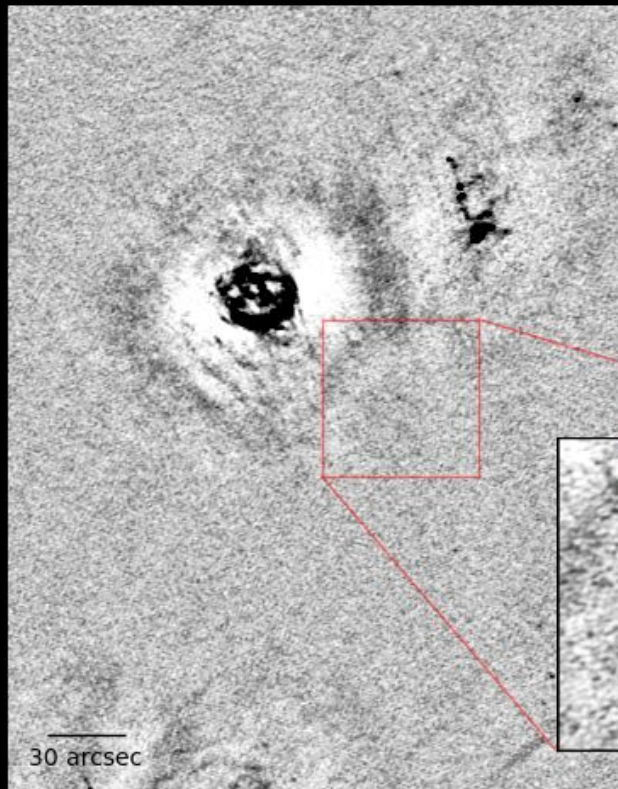


The Smudge

Location: Galactic Center?
Spectral Index: Dusty 3.75
Mass: $\sim 10 M_{\odot}$
Status: Pre-stellar Core

The Smudge



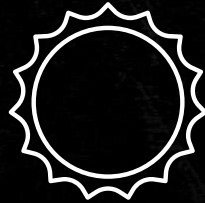
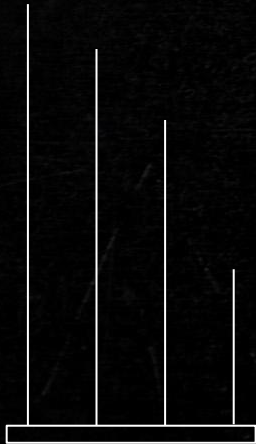


Is the Smudge in the
Galactic Center?
Line of sight velocity:
33 km/s

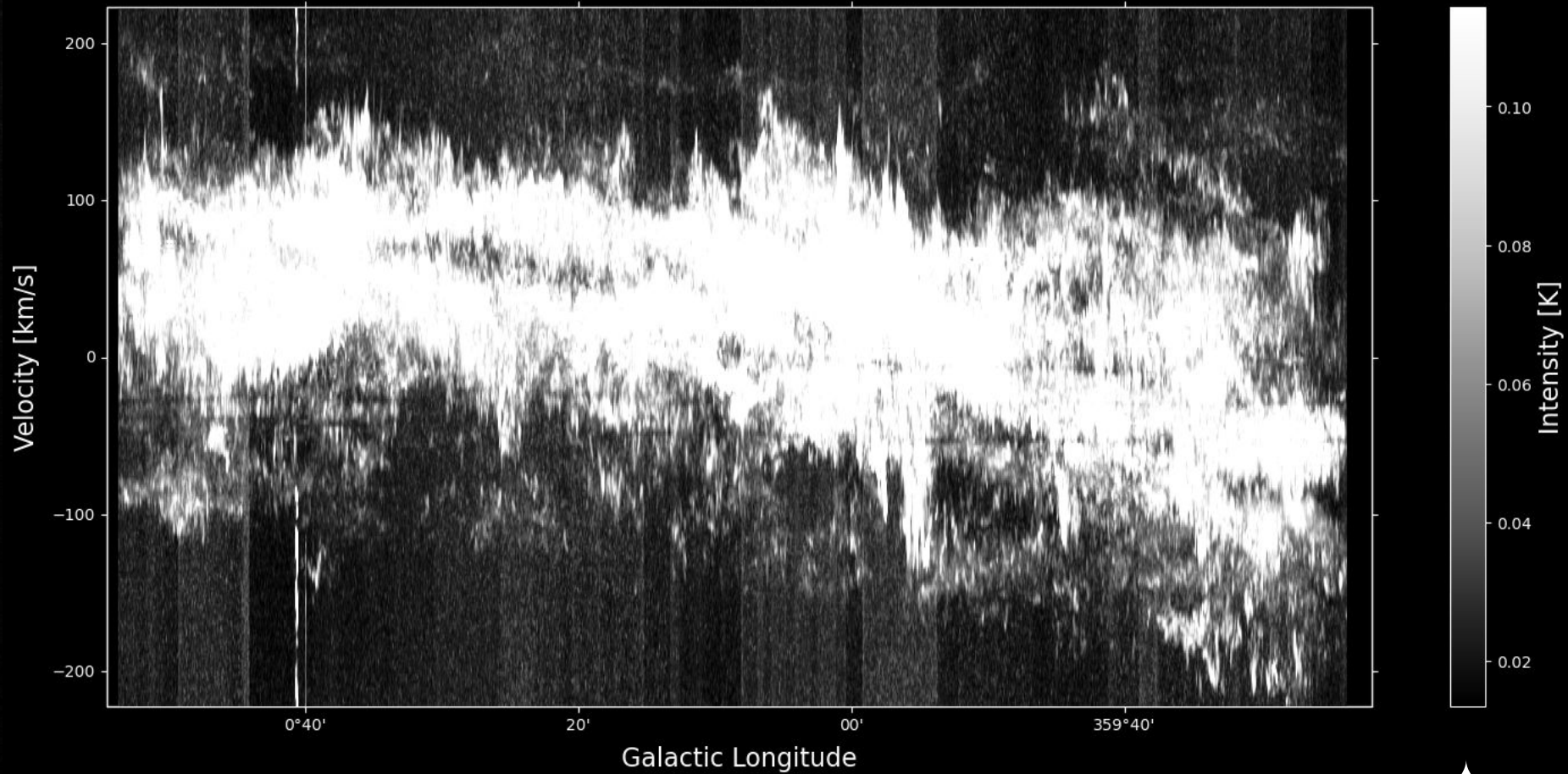
**Where is the
Smudge?**

SiO 2-1 v=1

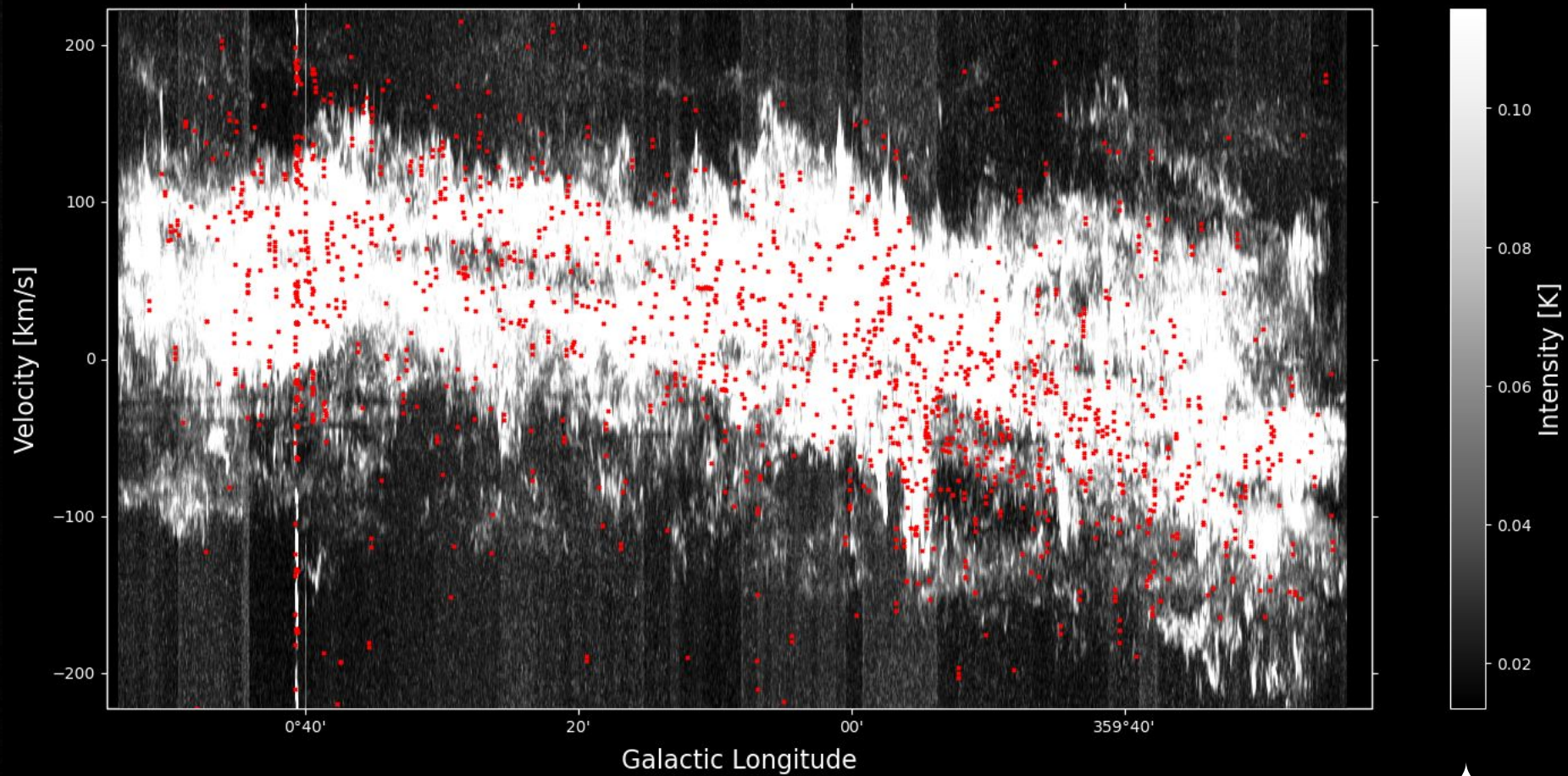
Masers

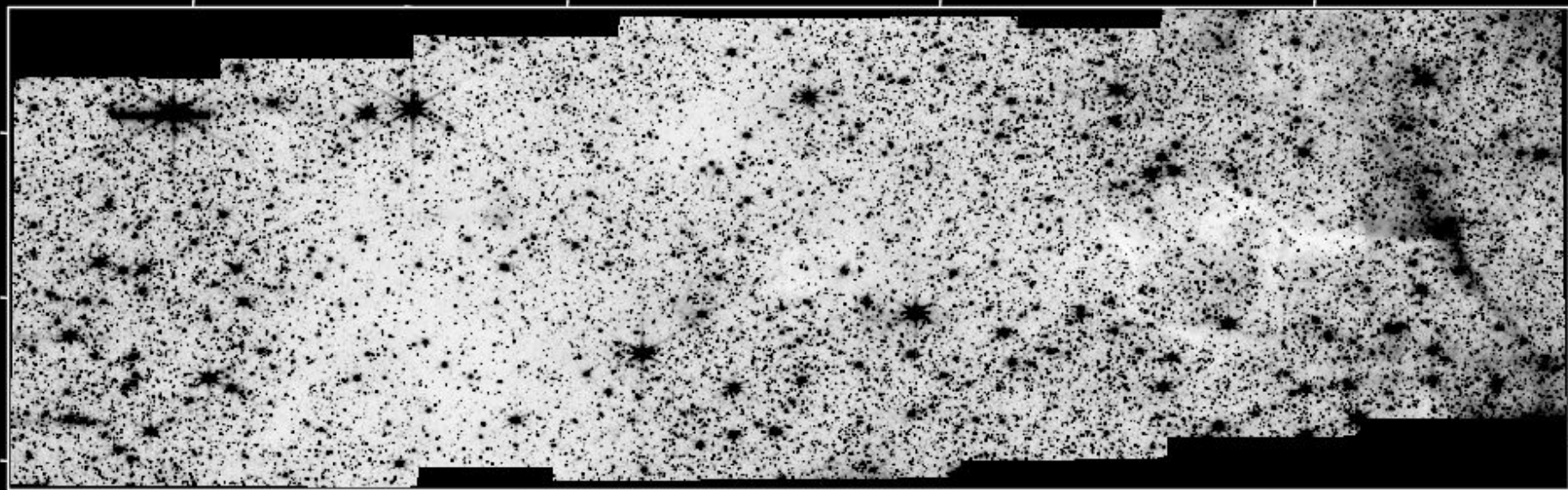


CS 2-1



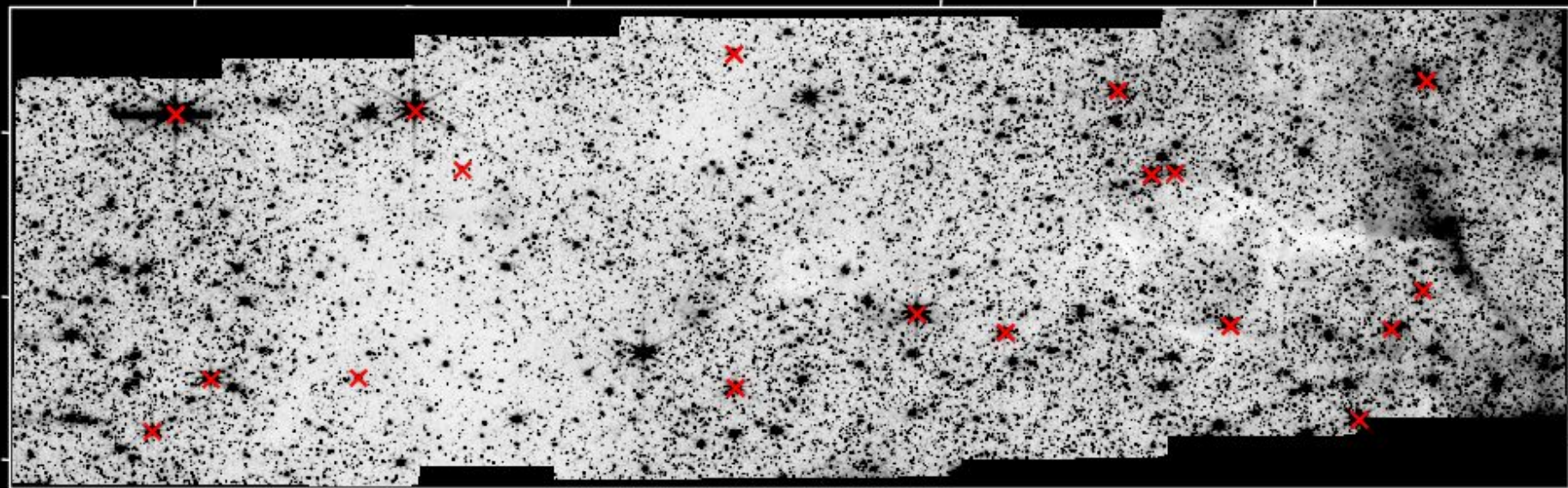
CS 2-1





17^h46^m28^s

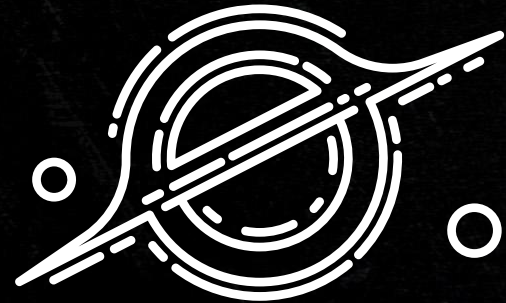
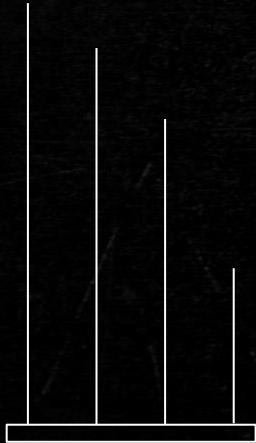
Right Ascension



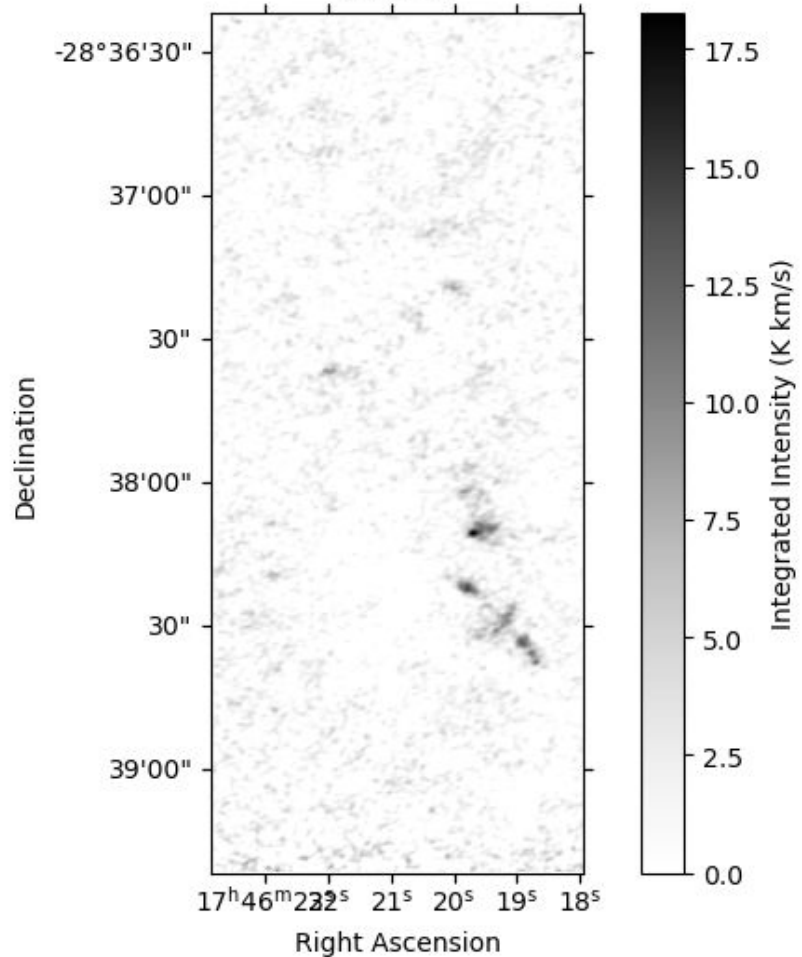
17^h46^m28^s

Right Ascension

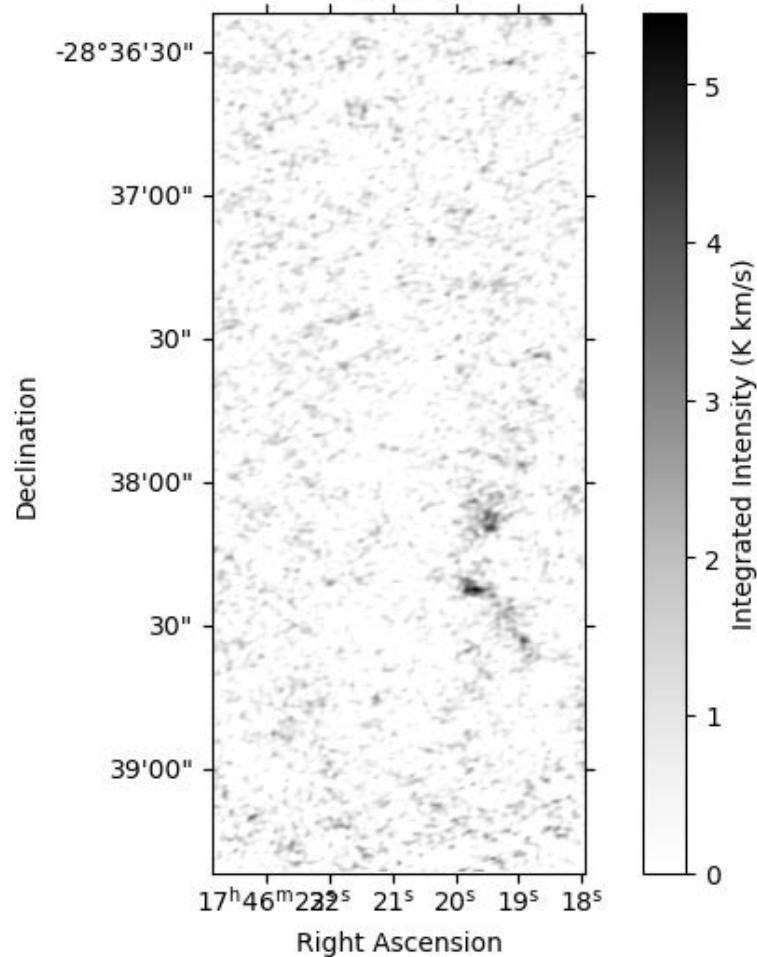
Extra Slides!



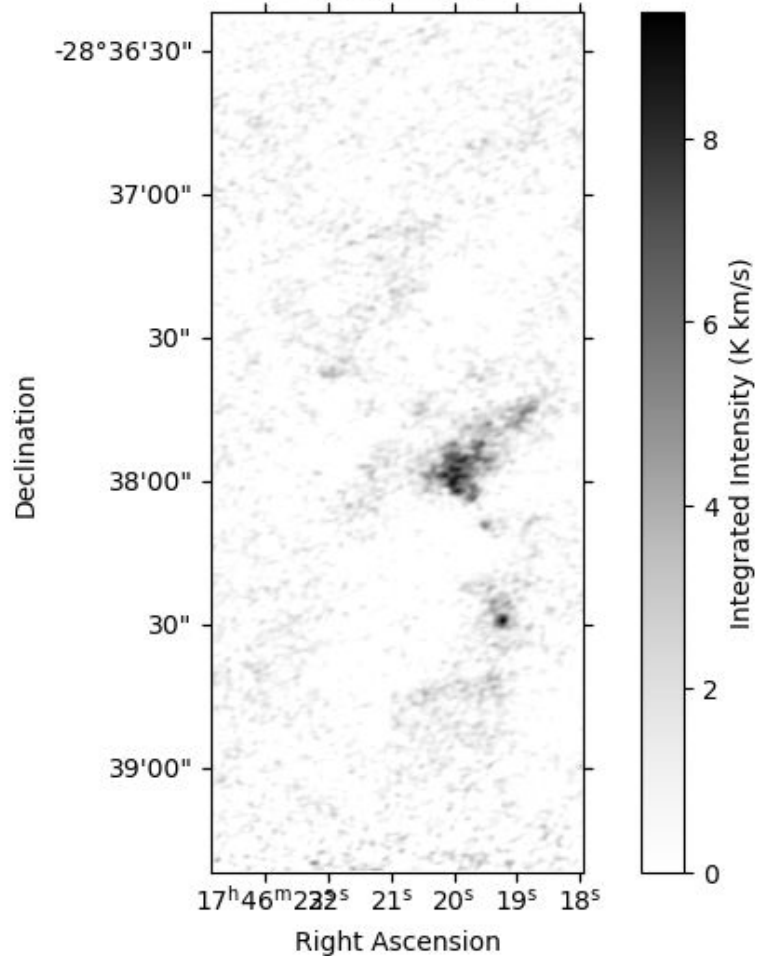
CS 2-1



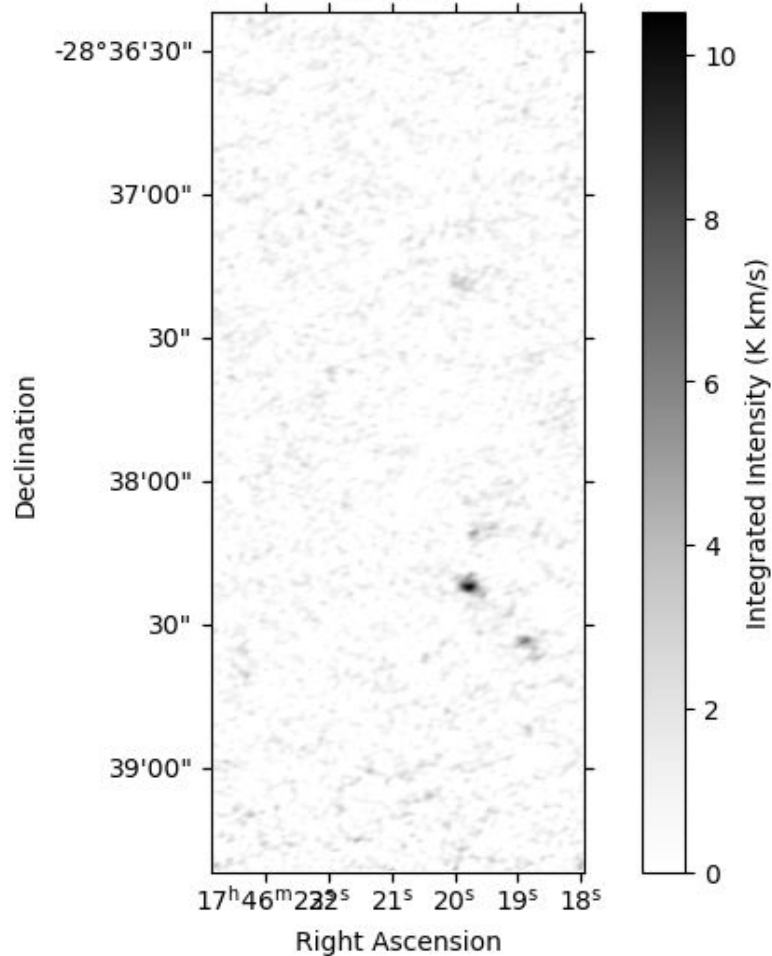
HNCO 4-3



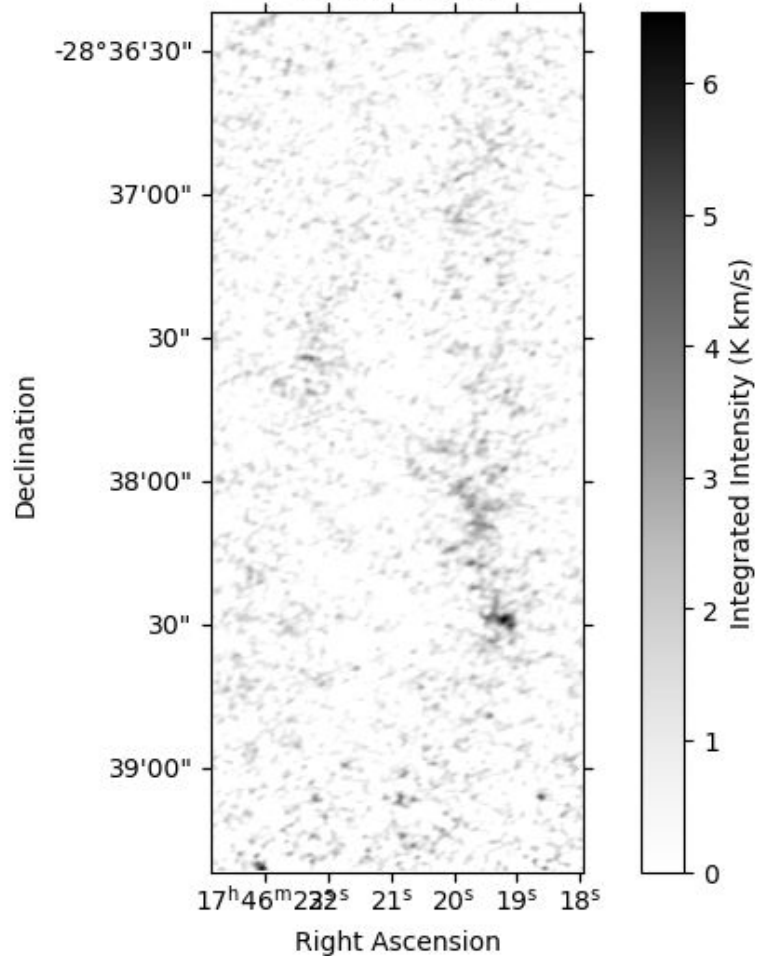
HCO+ 1-0



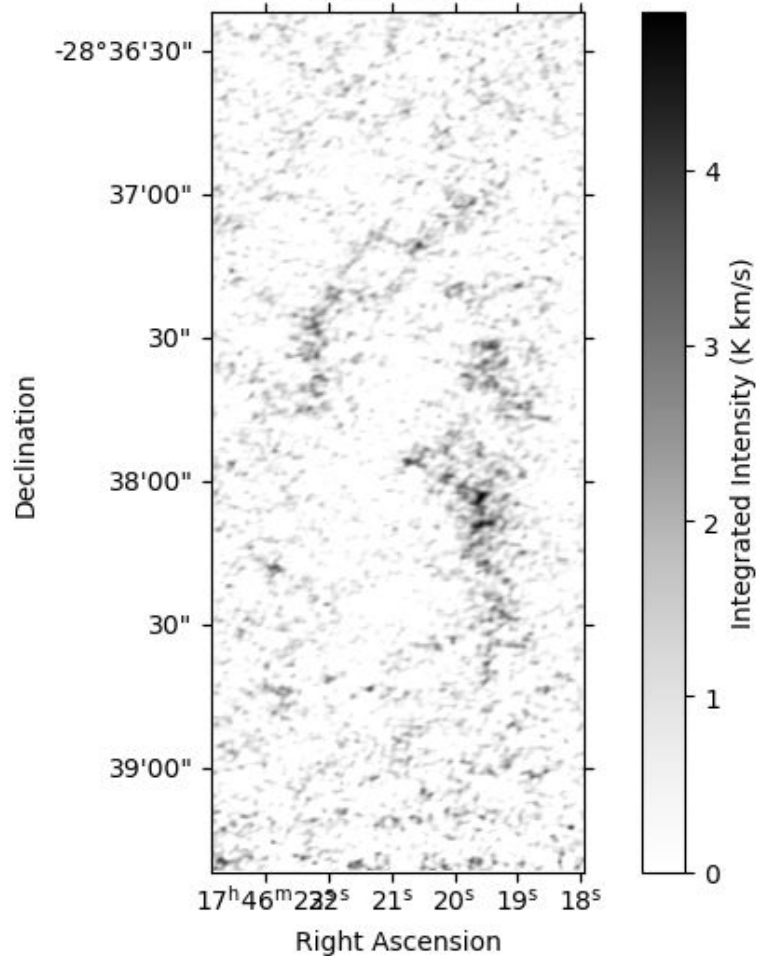
SiO 2-1



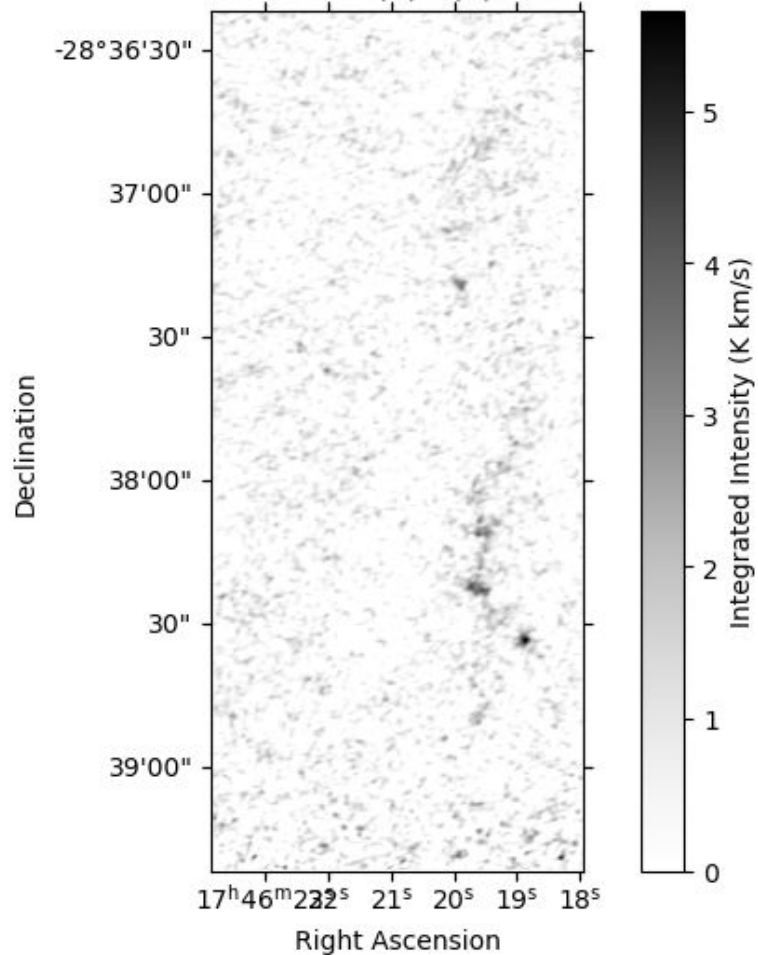
H13CO+ 1-0



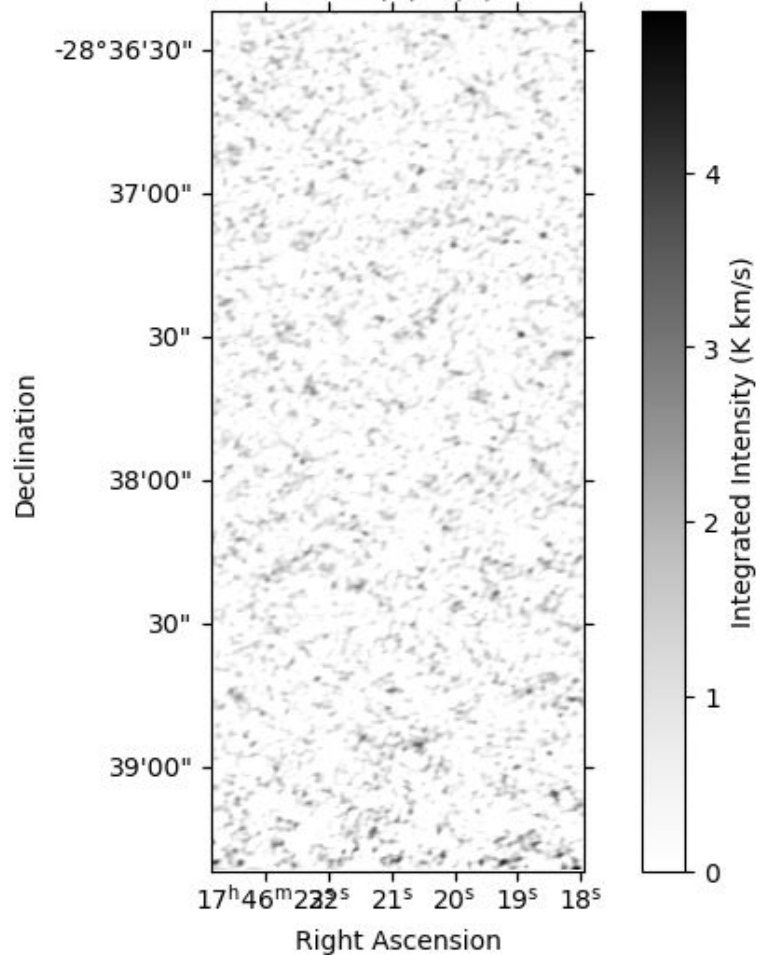
HN13C 1-0



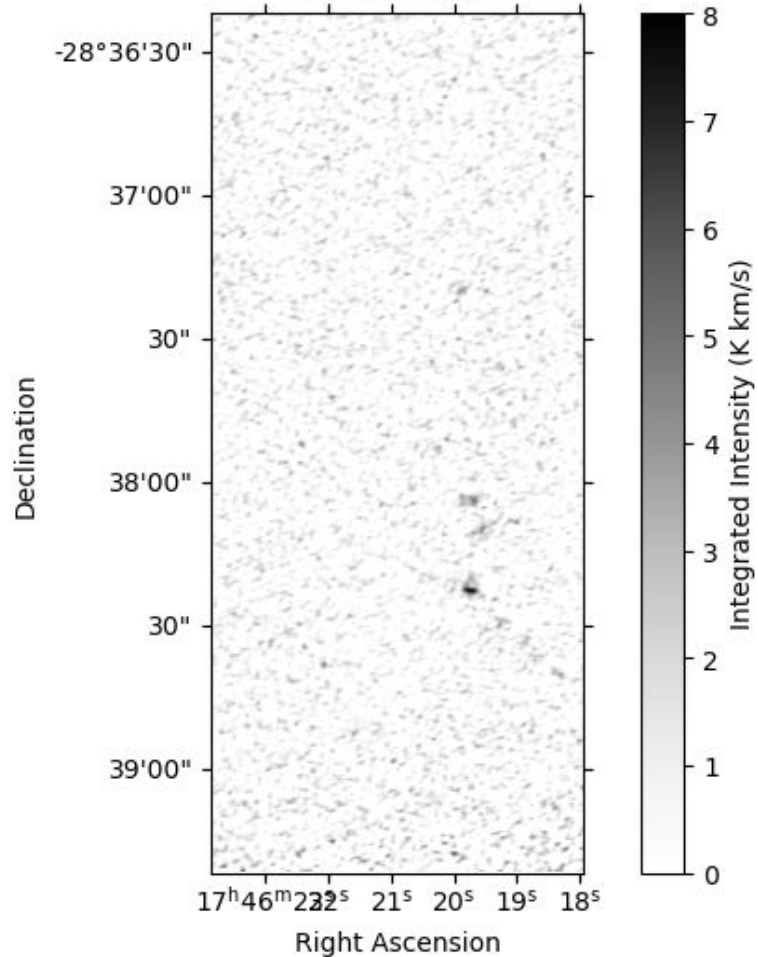
SO 3(2)-2(1)



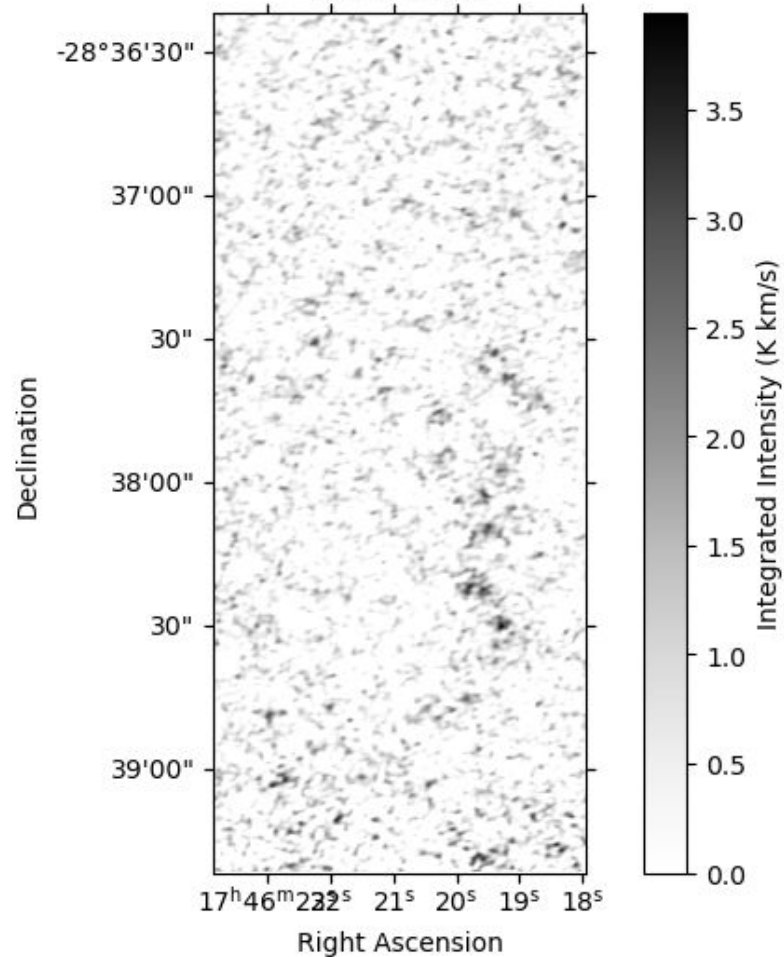
SO 2(2)-1(1)

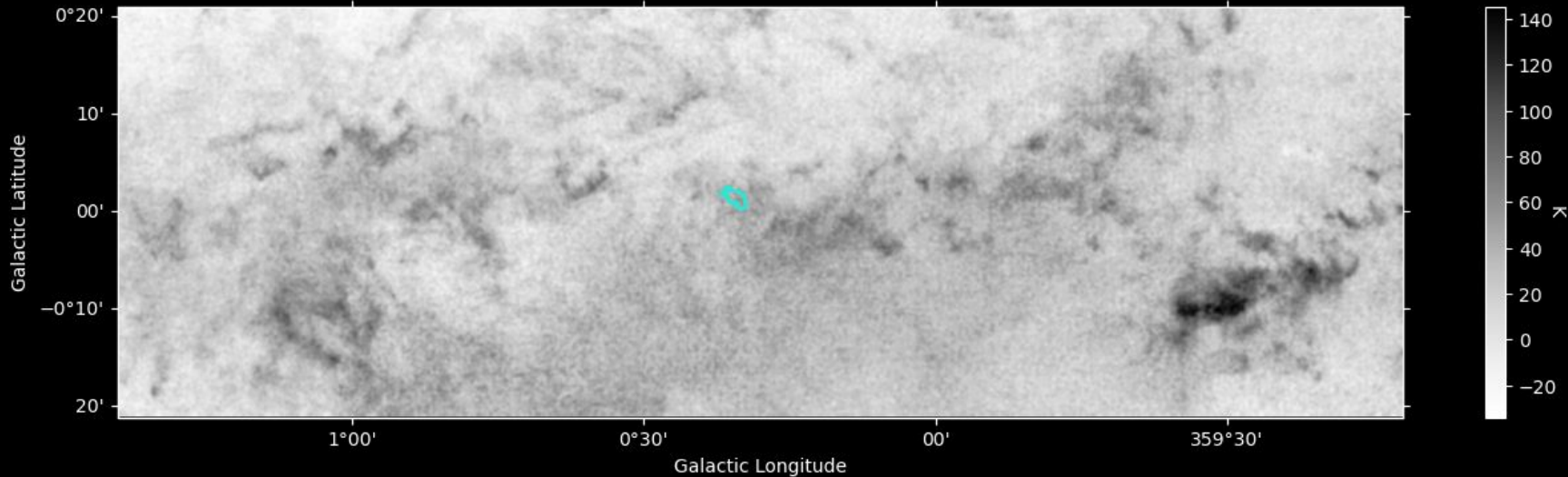


HC3N 11-10



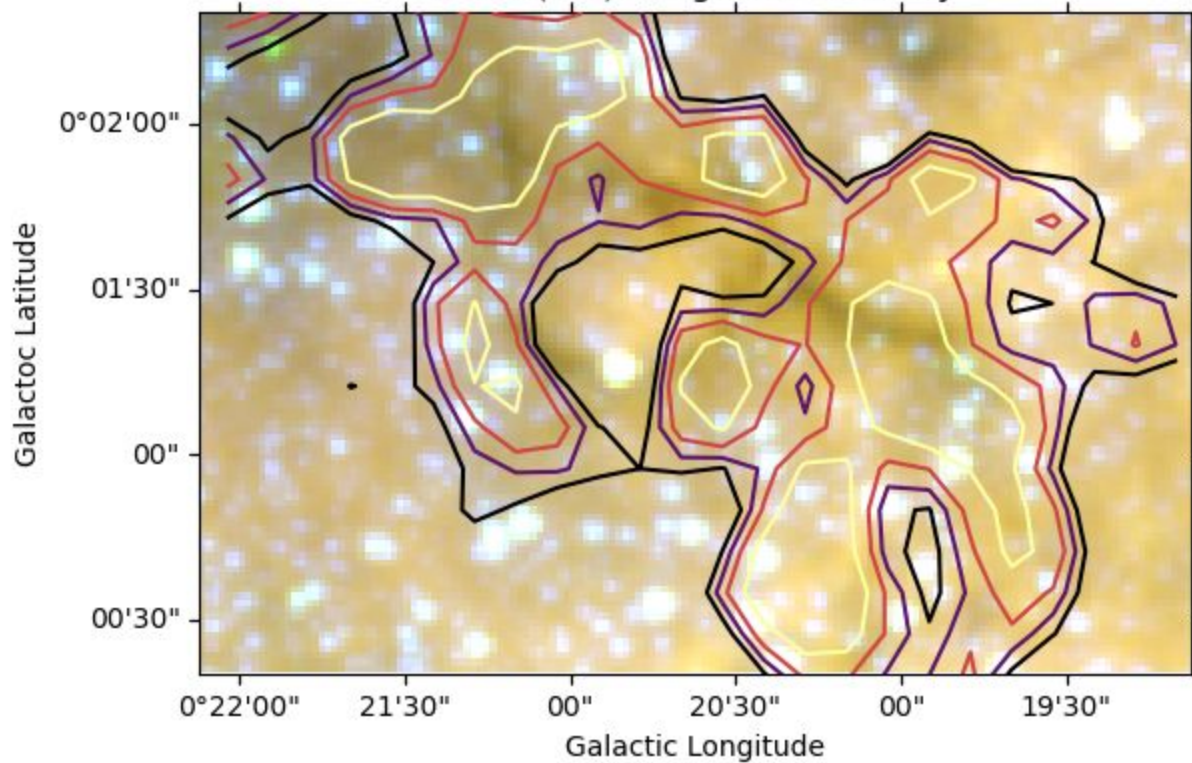
H13CN 1-0



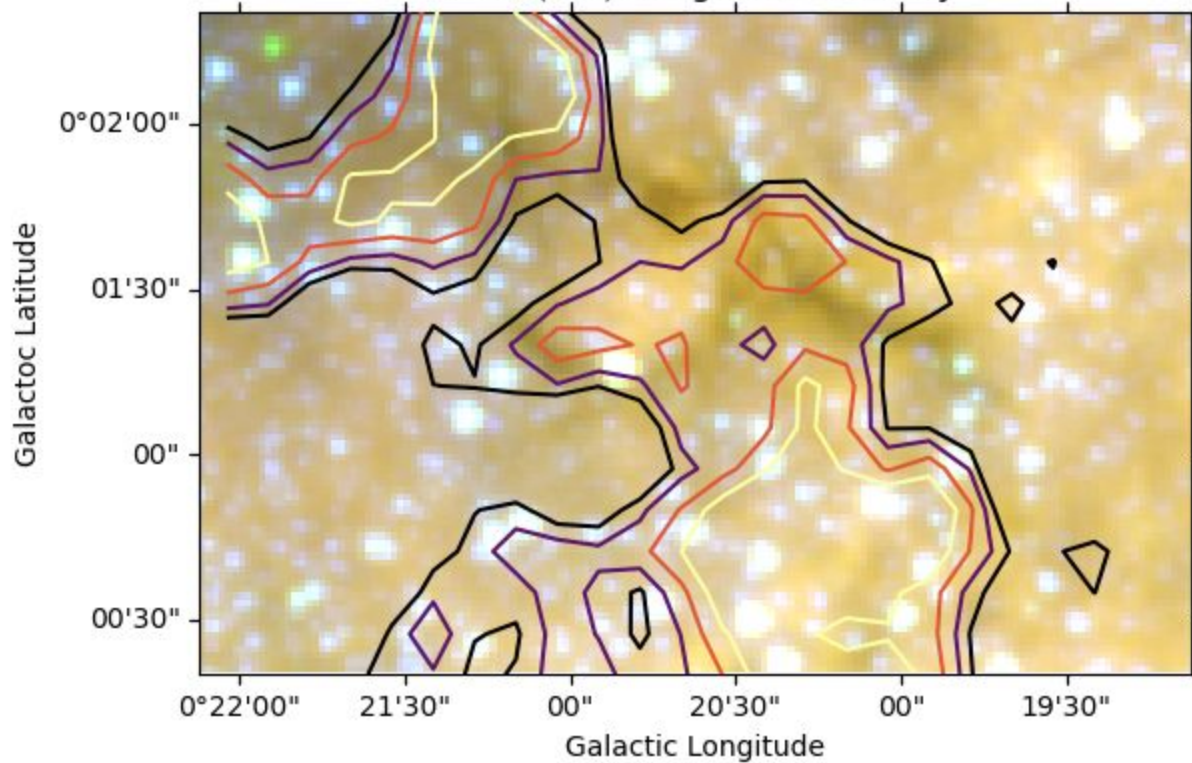


**Filament region on 12CO 1-0
moment 0 -60 to -50 km/s**

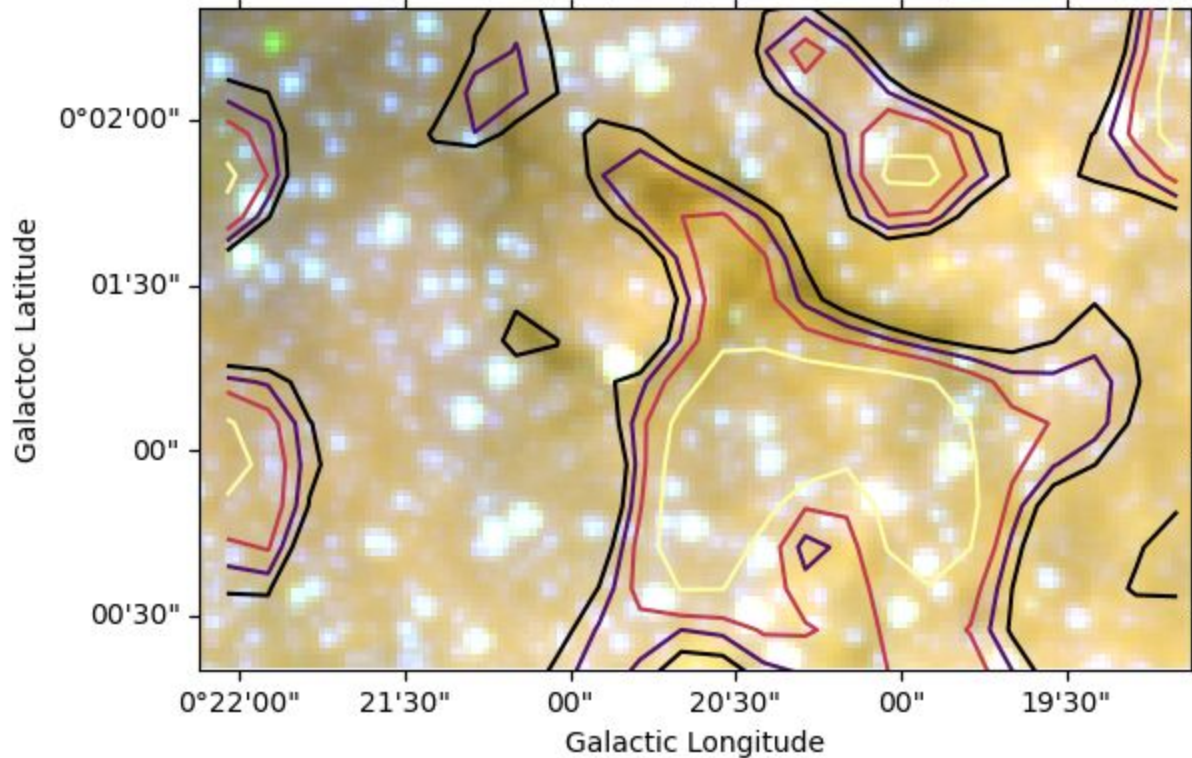
C18O (1-0) Integrated Intensity

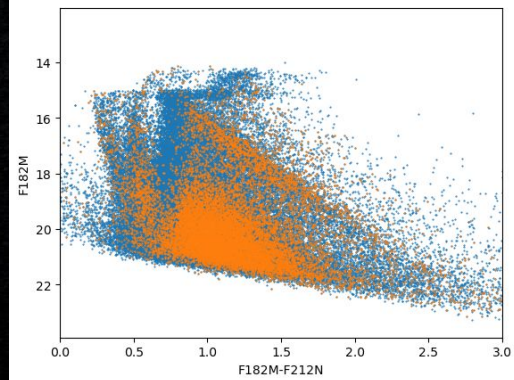
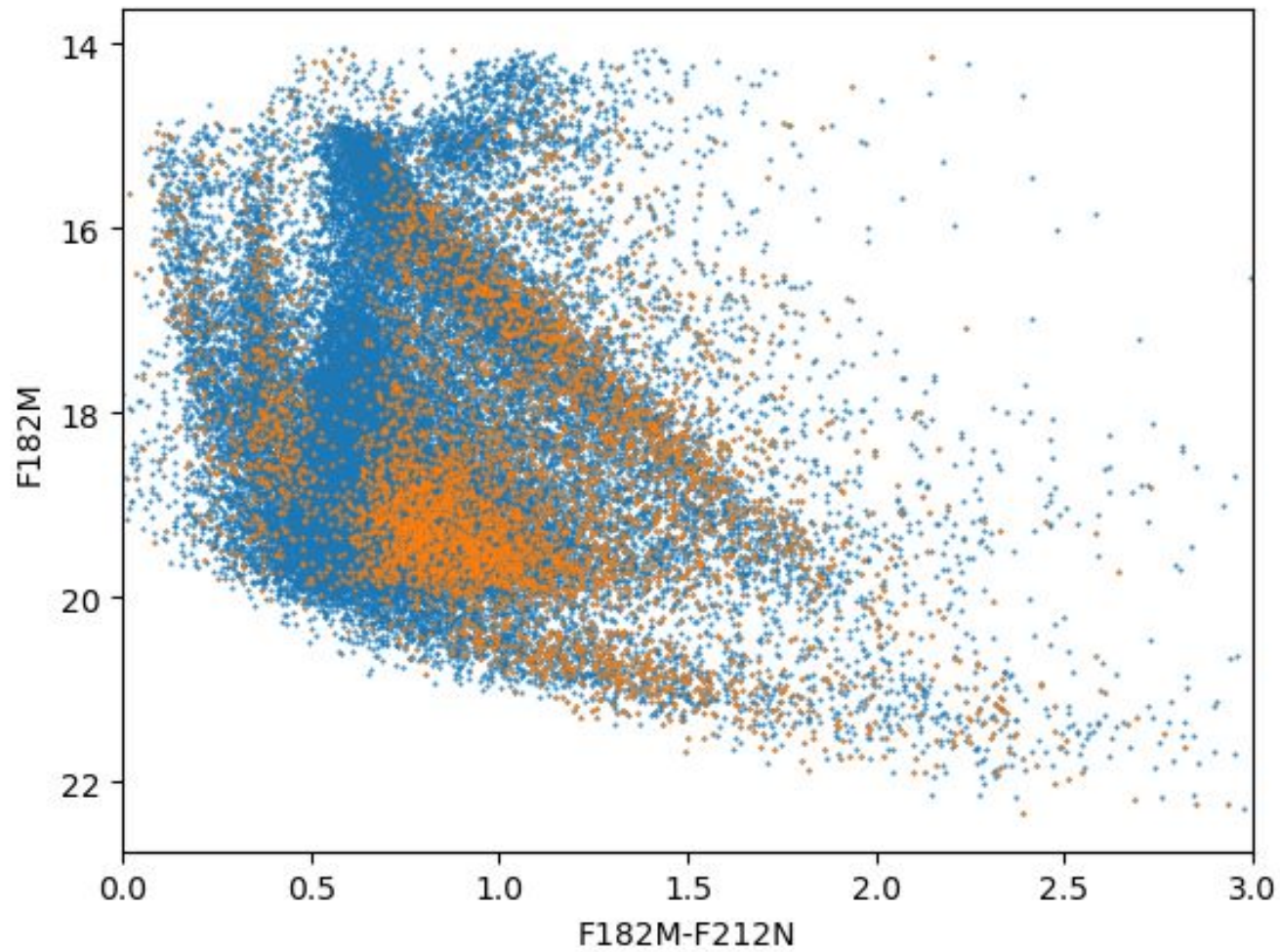


13CO (1-0) Integrated Intensity

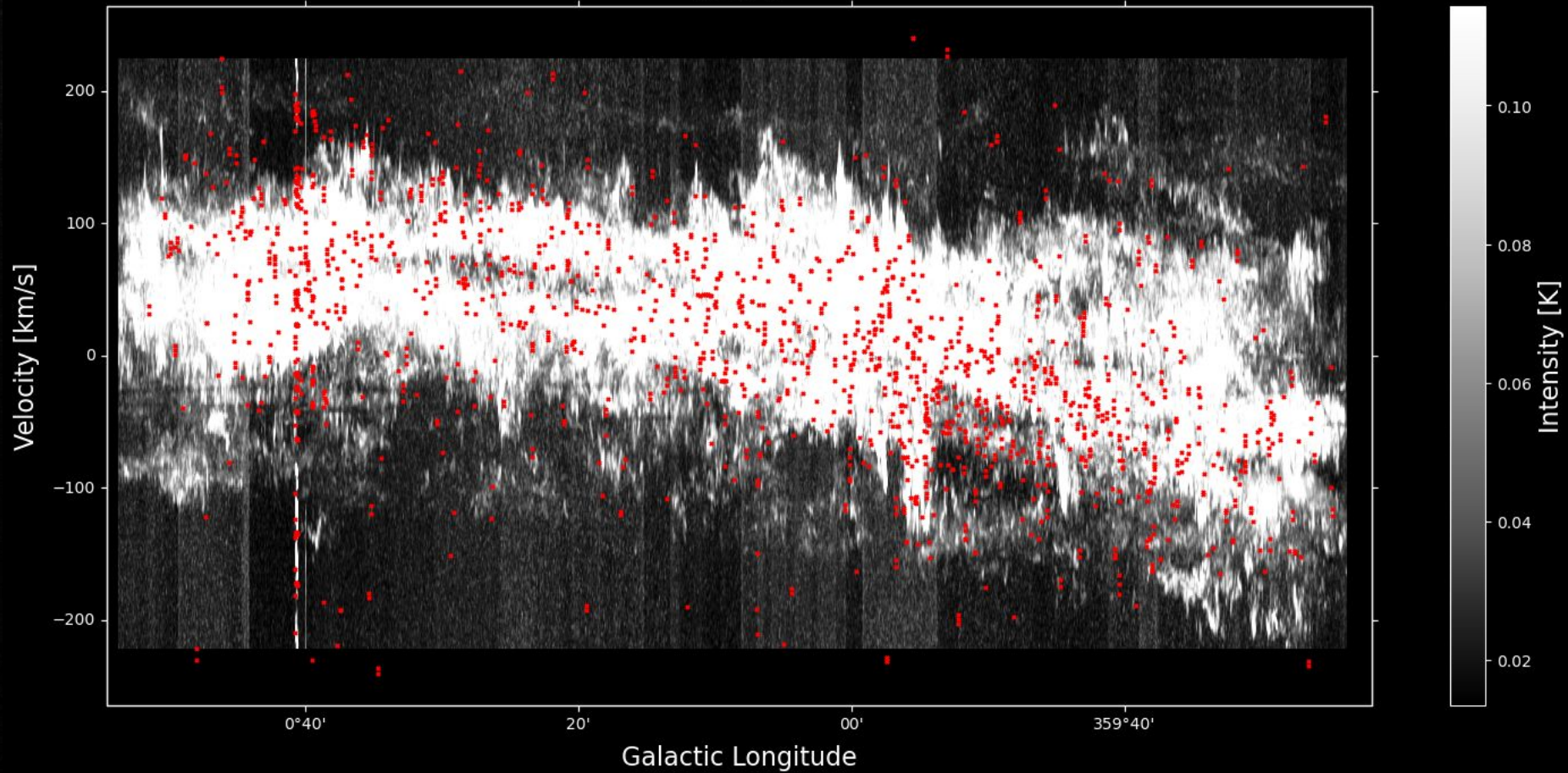


12CO (1-0) Integrated Intensity

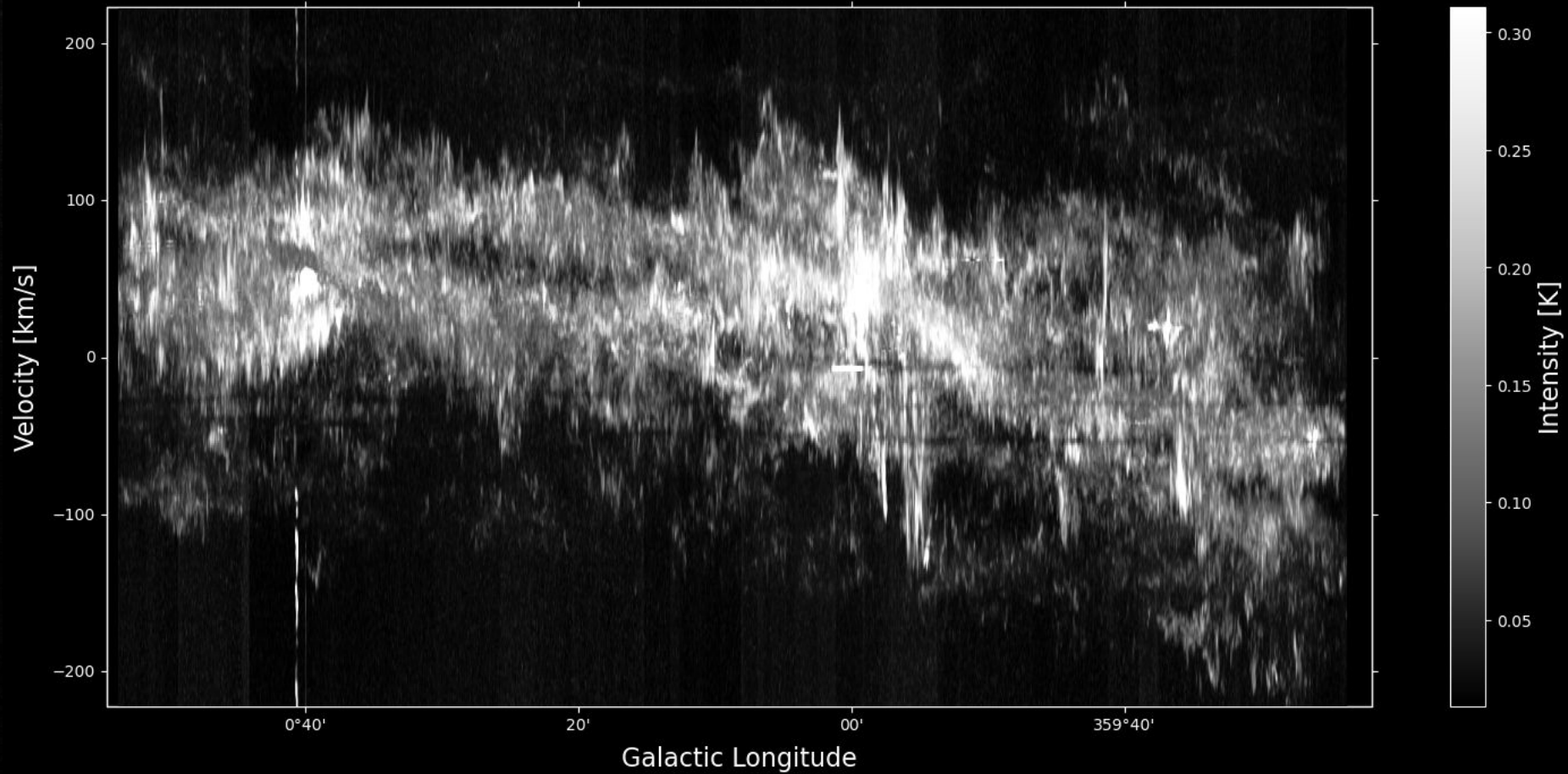




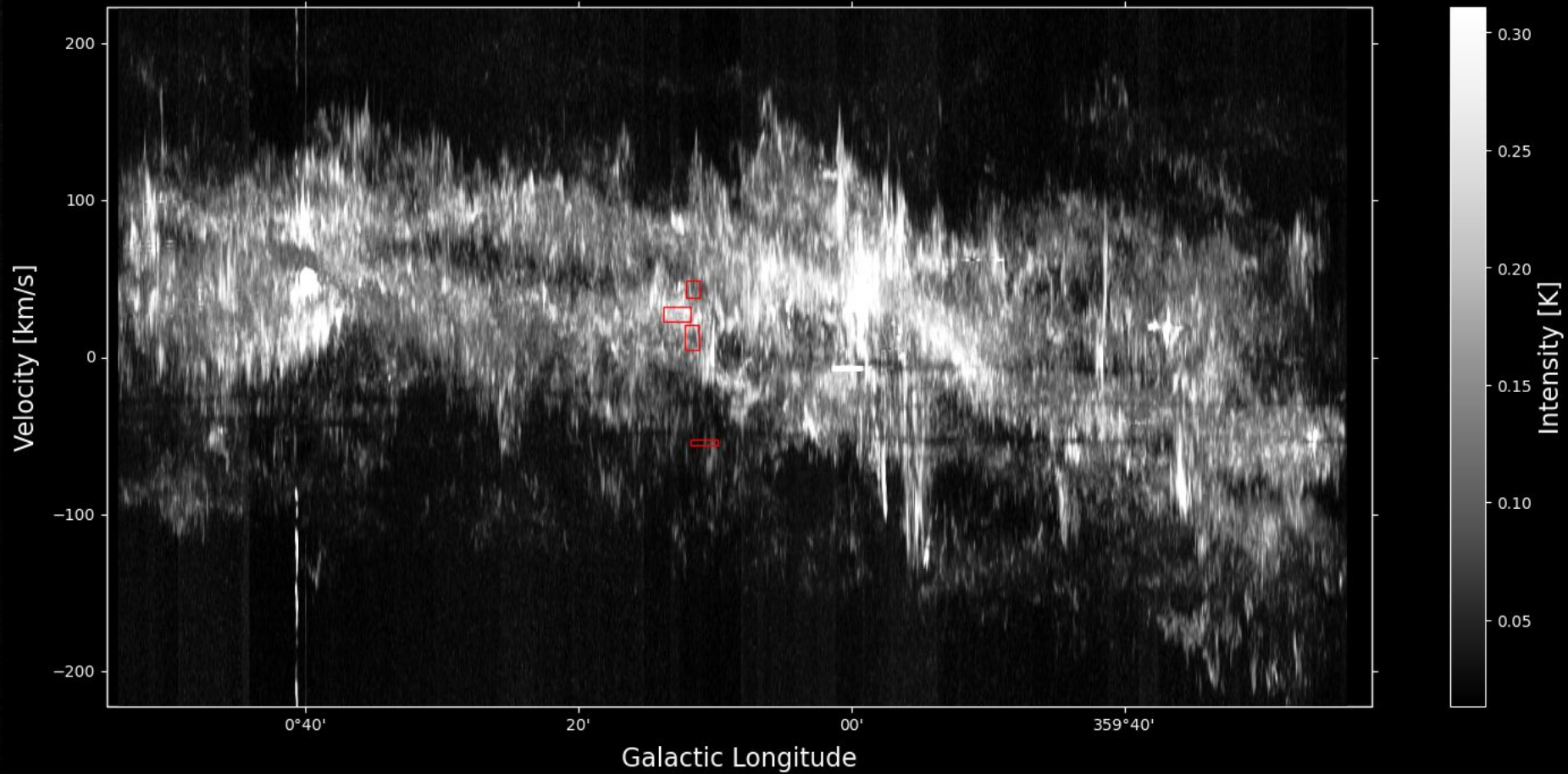
CS 2-1

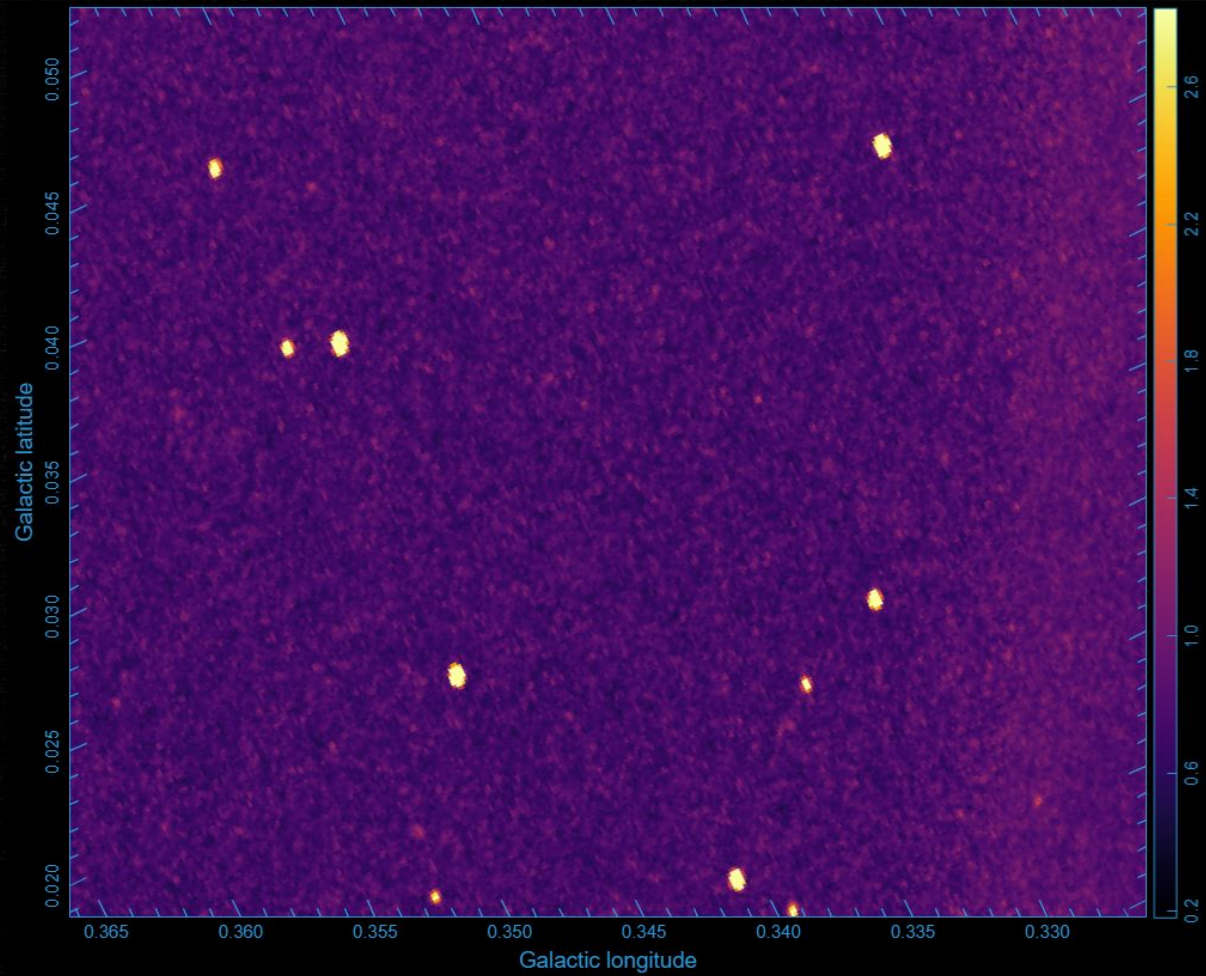


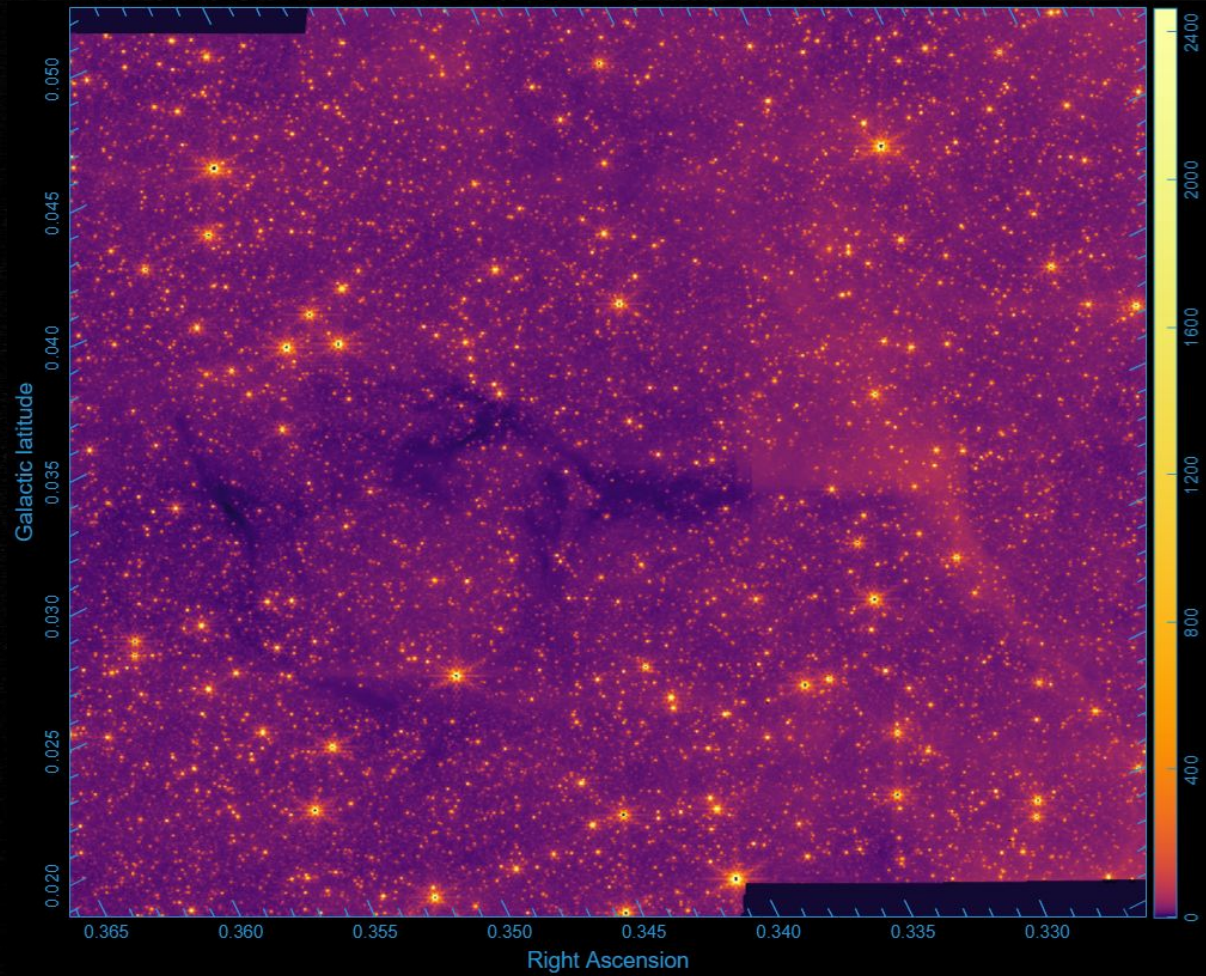
CS 2-1



CS 2-1







Credits



- ★ Data used from:
 - JWST
 - Spitzer
 - ALMA
 - ACES
 - Nobeyama



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THANKS!



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