A stellar cluster in formation - filamentary inflow induced by colliding filaments

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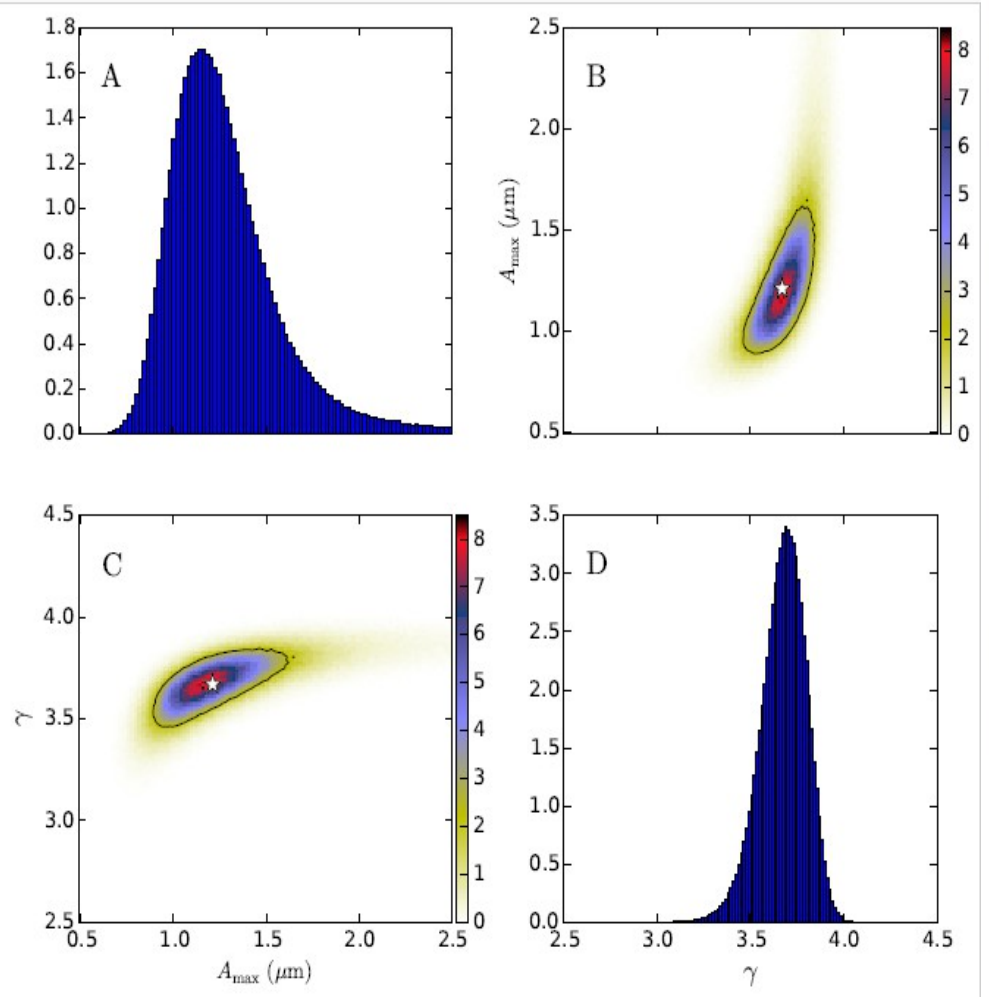
Scattering paper

- Scattering at J,H,K, and 3.6 μm

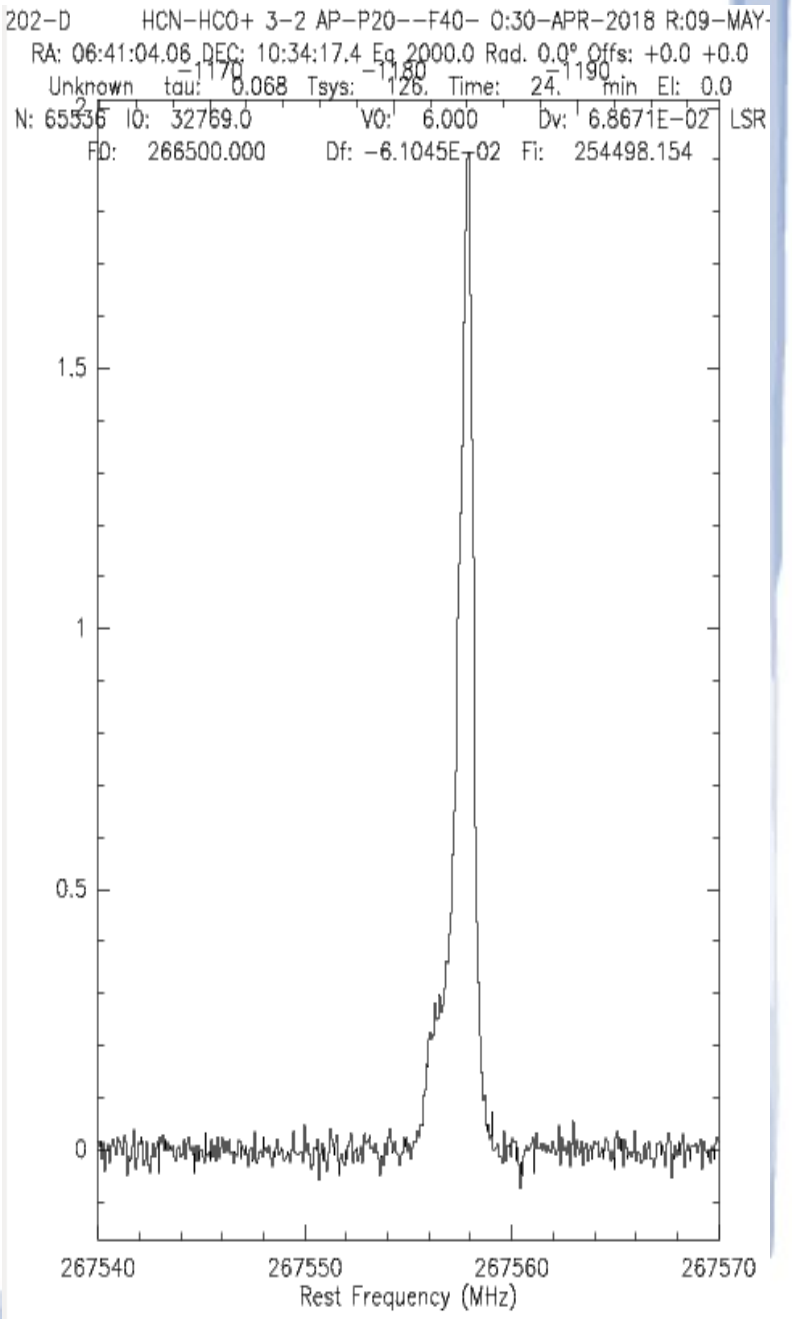
  → Dust properties

- It is possible, but:
  - Information about ISRF needed
  - High S/N on surface brightness observations
  - Density of the field



APEX proposal

- Protostellar activity in selected GCC fields
  - 7 fields in total with different morphologies
- Small maps of ~ 4' x 4' in CO
- Single pointings in HCO+ HCN
- Requested 33h
  - More than 35h used

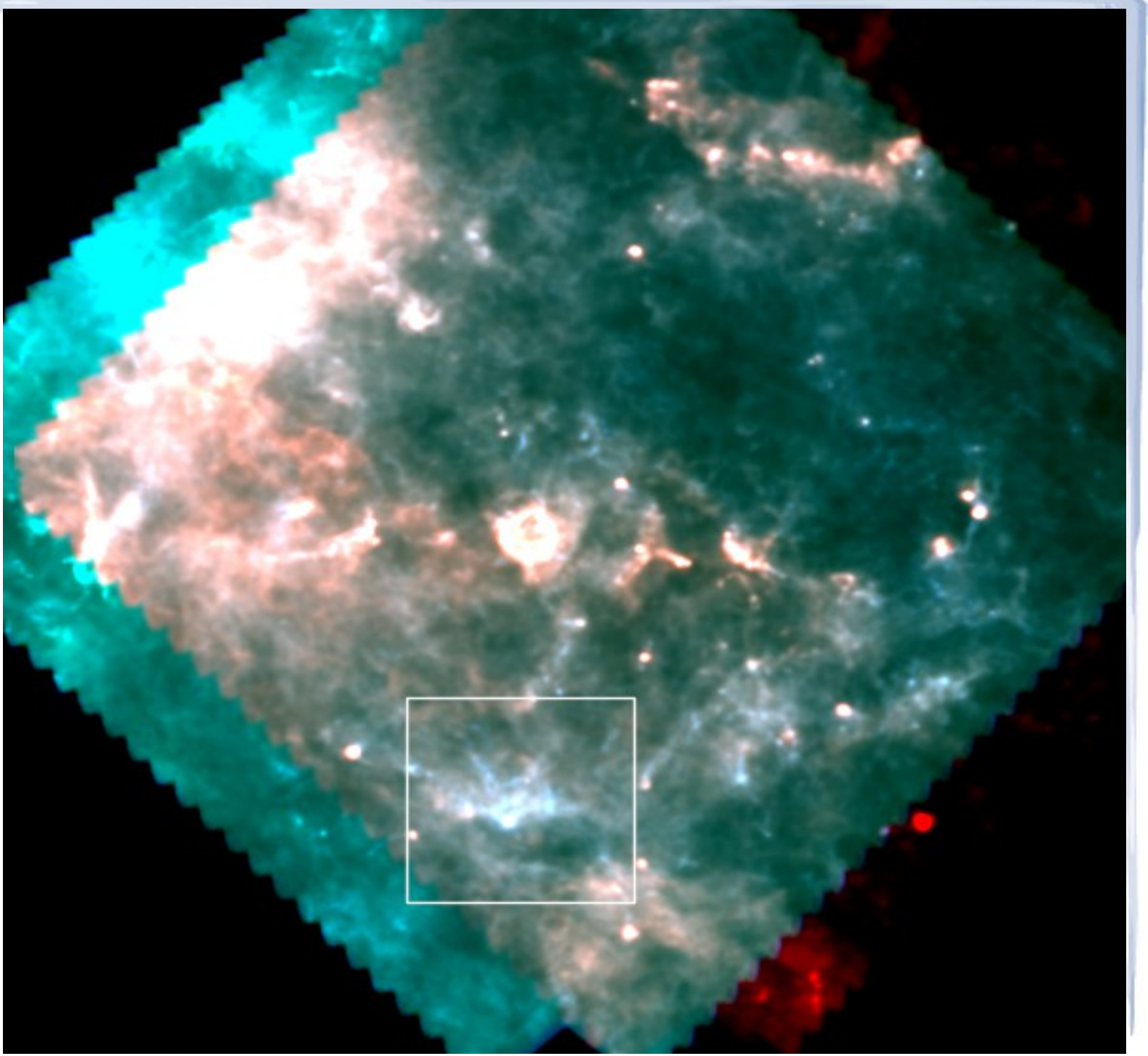


G74

Distance:
~3300 pc

Mass of the Clump:
> 7000 $M_{\odot}$

Temperature:
~11 -15 K

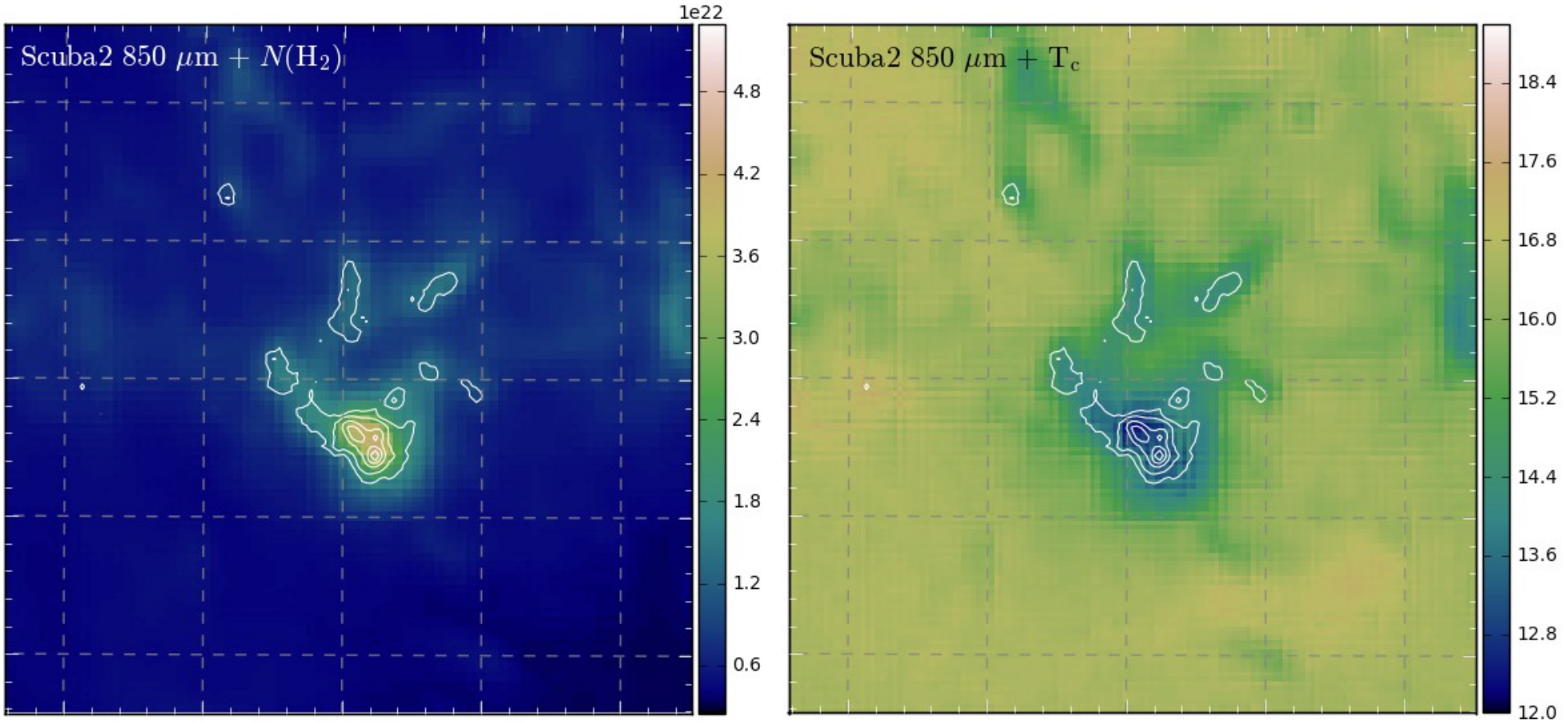


Follow-up observations

- Aims:
  - Structure and kinematics of clouds forming stellar clusters / high-mass stars
  - Finding suitable targets for detailed studies of cluster-forming clumps
  - Search for massive prestellar cores

Dust continuum

- Column density and temperature from Herschel observations
- Contour: Scuba-2 850 μm map

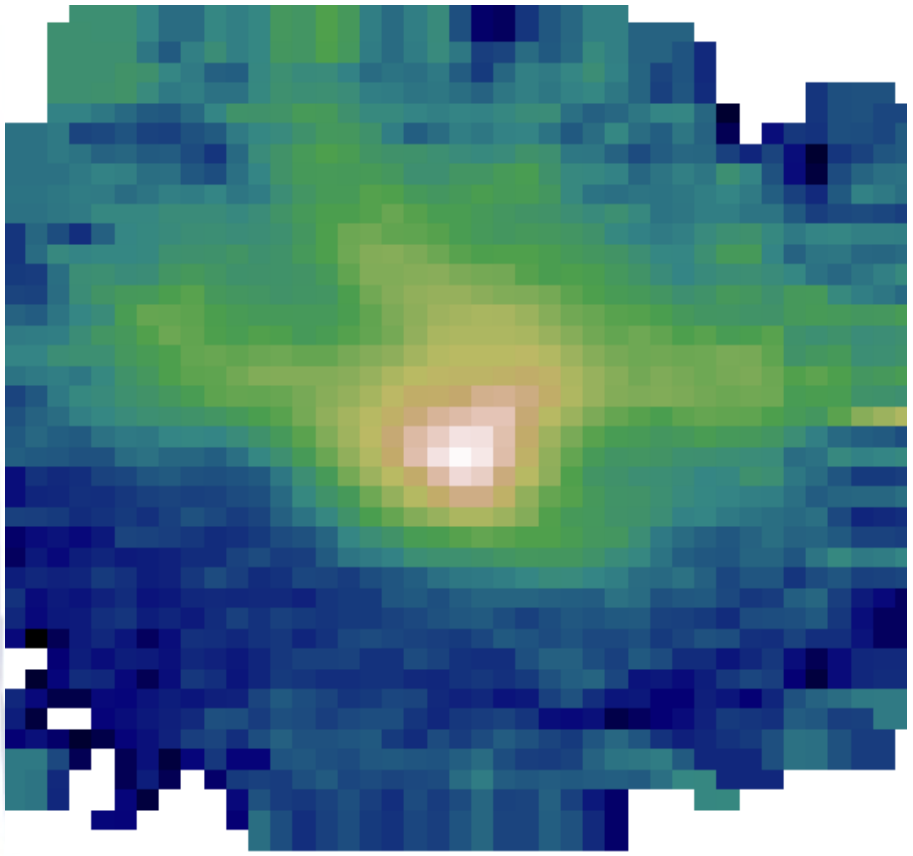


Molecular lines

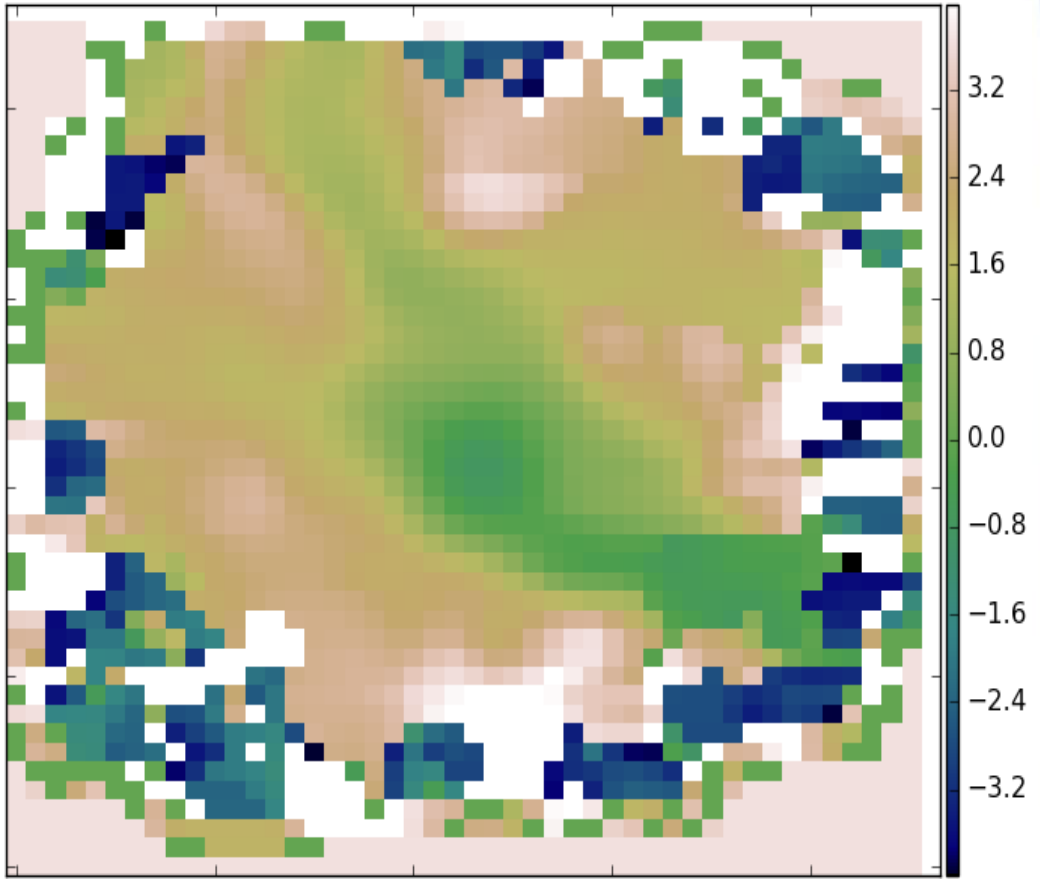
- Korean VLBI Network (KVN), one antenna
  - Dense gas tracers
  - Water maser
- Qinghai, (Purple mountain Observatory)
  - CO isotopologues
- Submillimeter Array (SMA)
  - Several lines
  - Continuum

CO maps

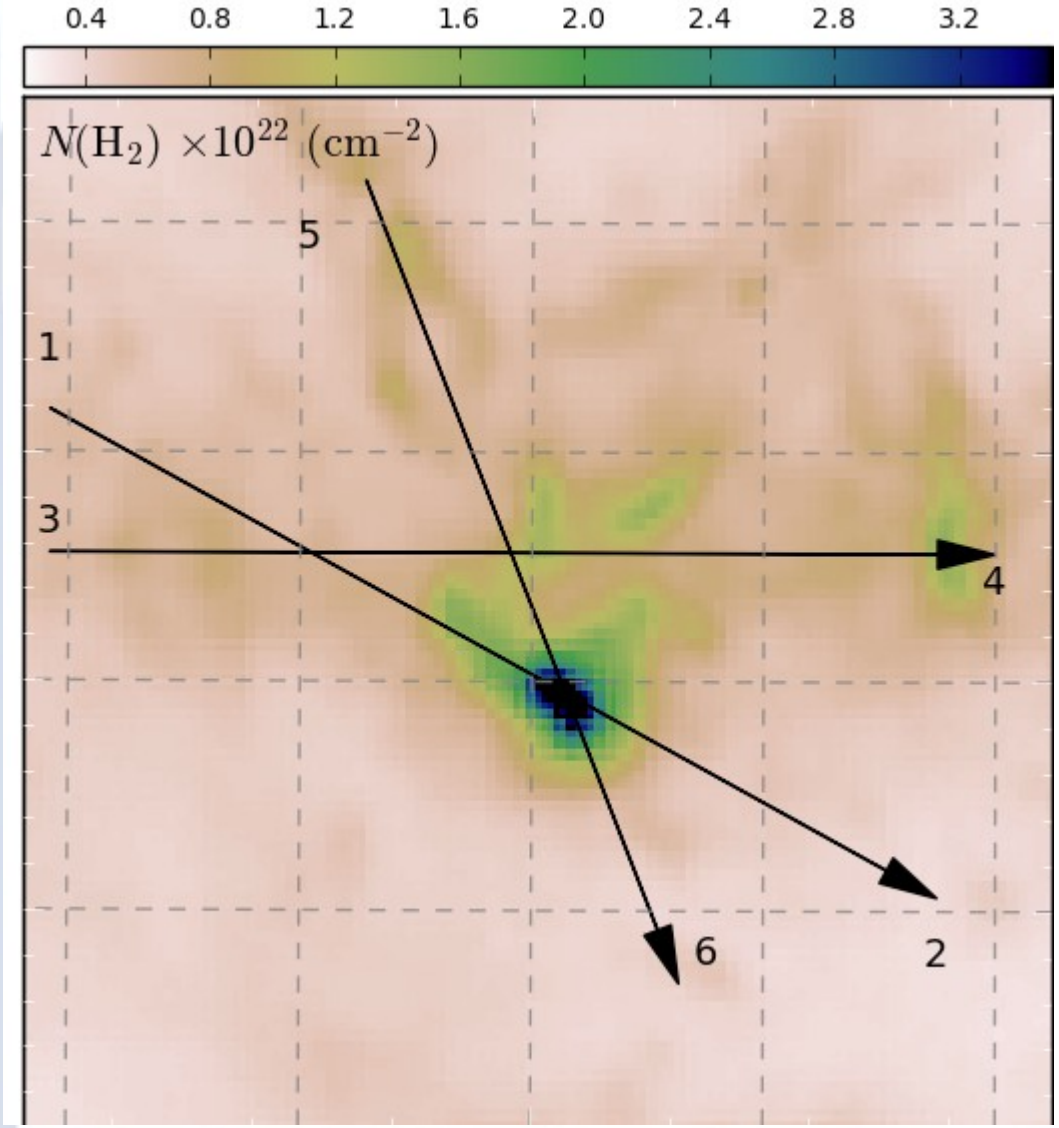
Integrated intensity

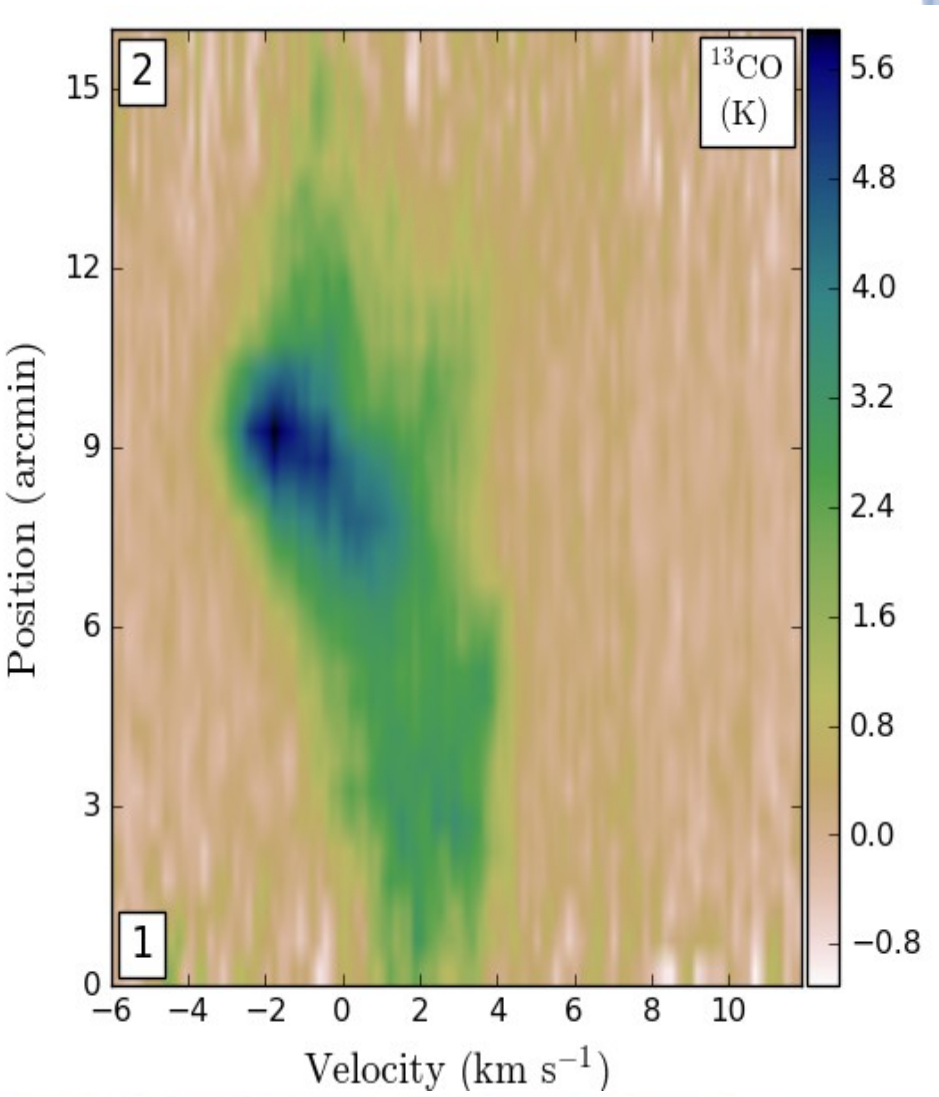


Velocity



Position-velocity maps

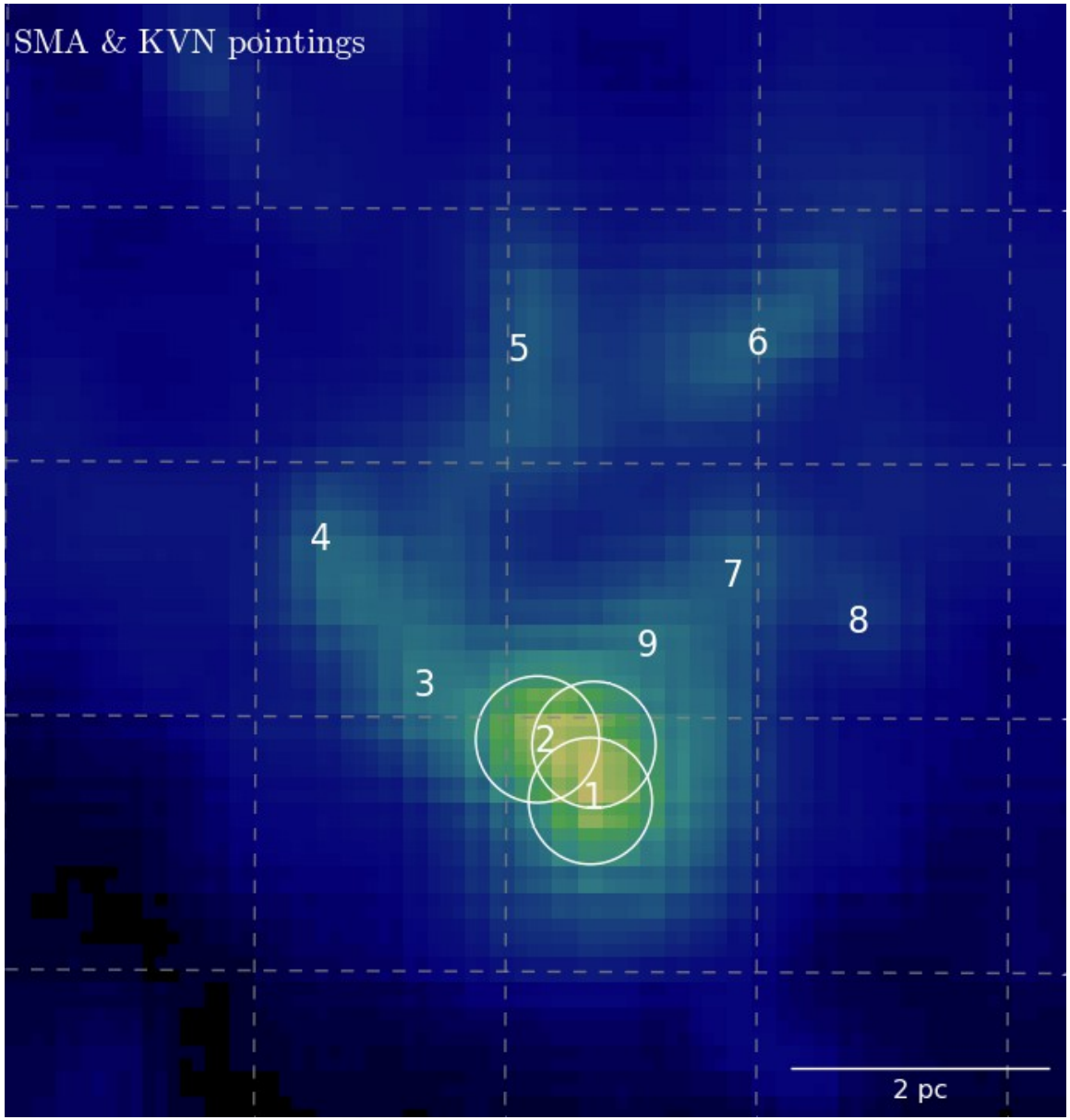




KVN and SMA observations

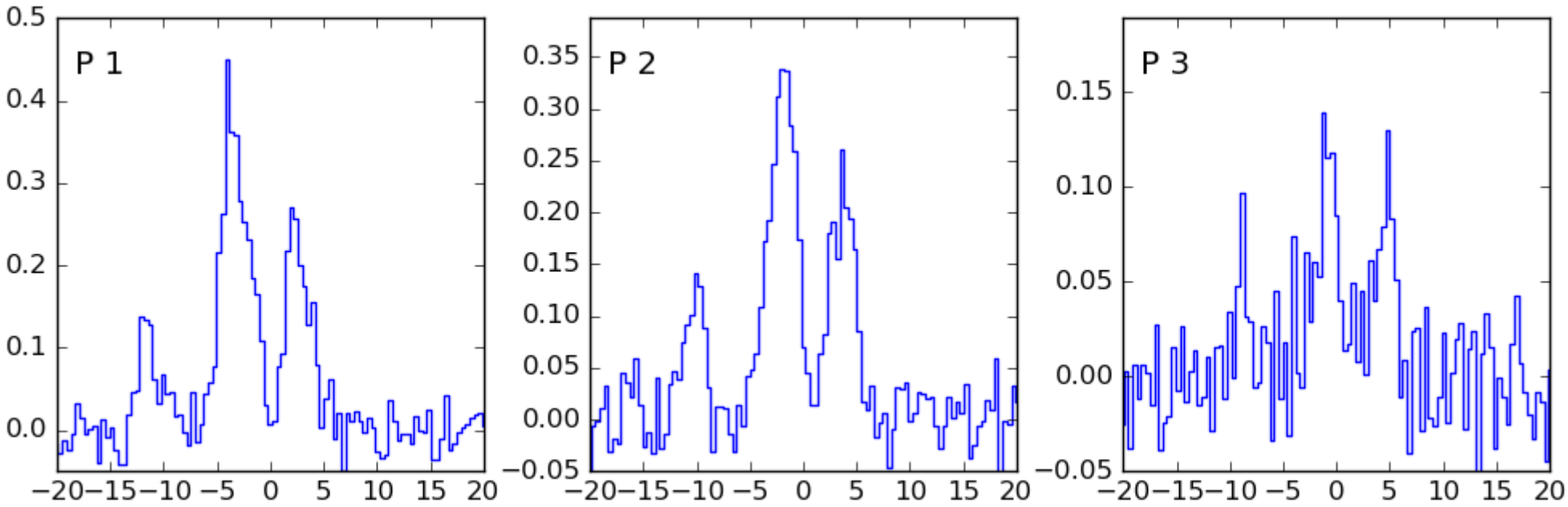
- KVN:
  9 pointings
  central region
  and the 'spiral
  arms'
- SMA:

  Three tracks
  covering the
  central region of
  the clump



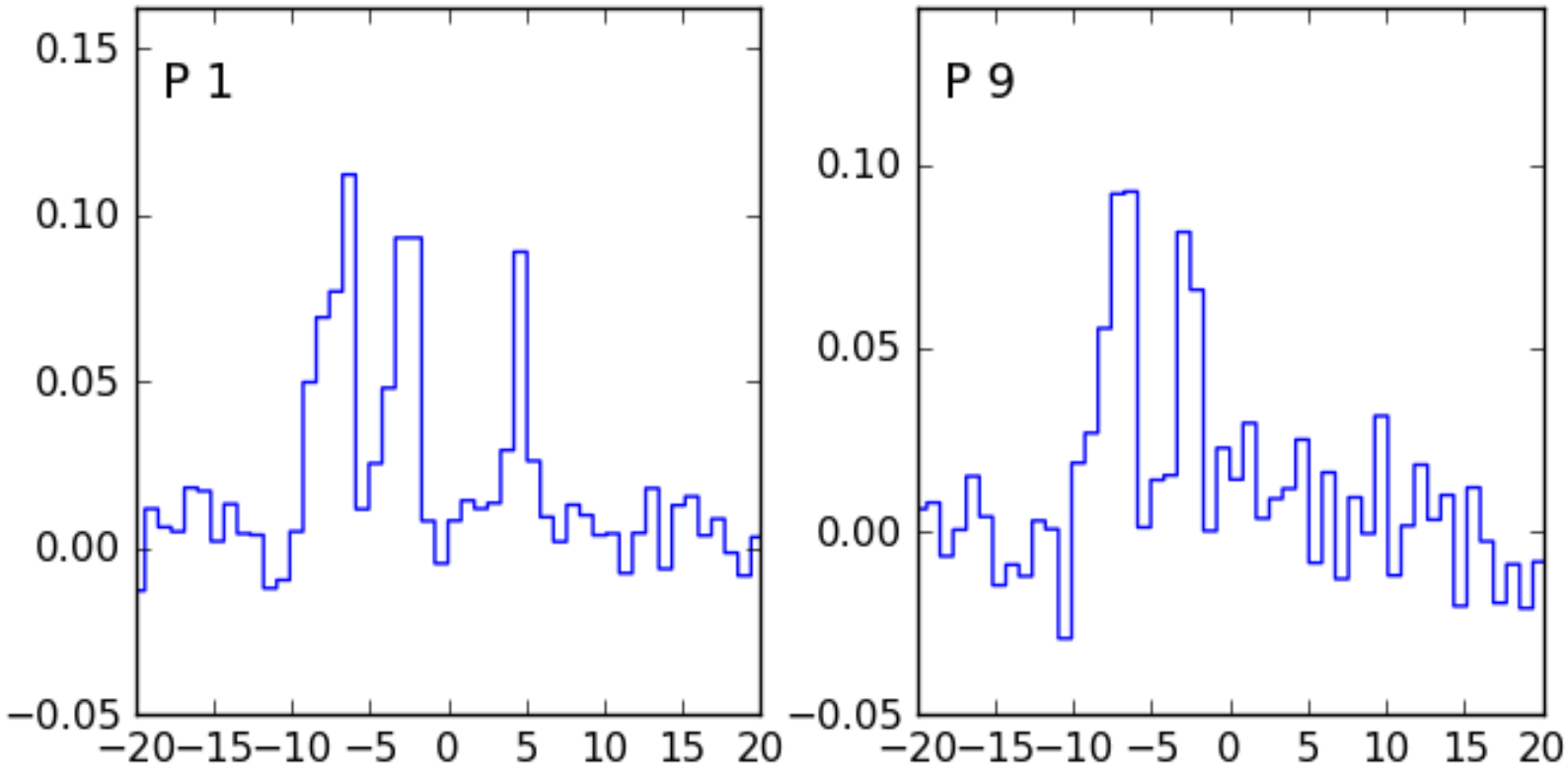
Dense gas tracers

- N2H+:Hyperfine fit to the components
  - Peak velocity shifts from -2.1 km/s to 0.2 km/s
  - FWHM: ~ 2.3 km/s
- Same shift in peak velocity seen in H2CO

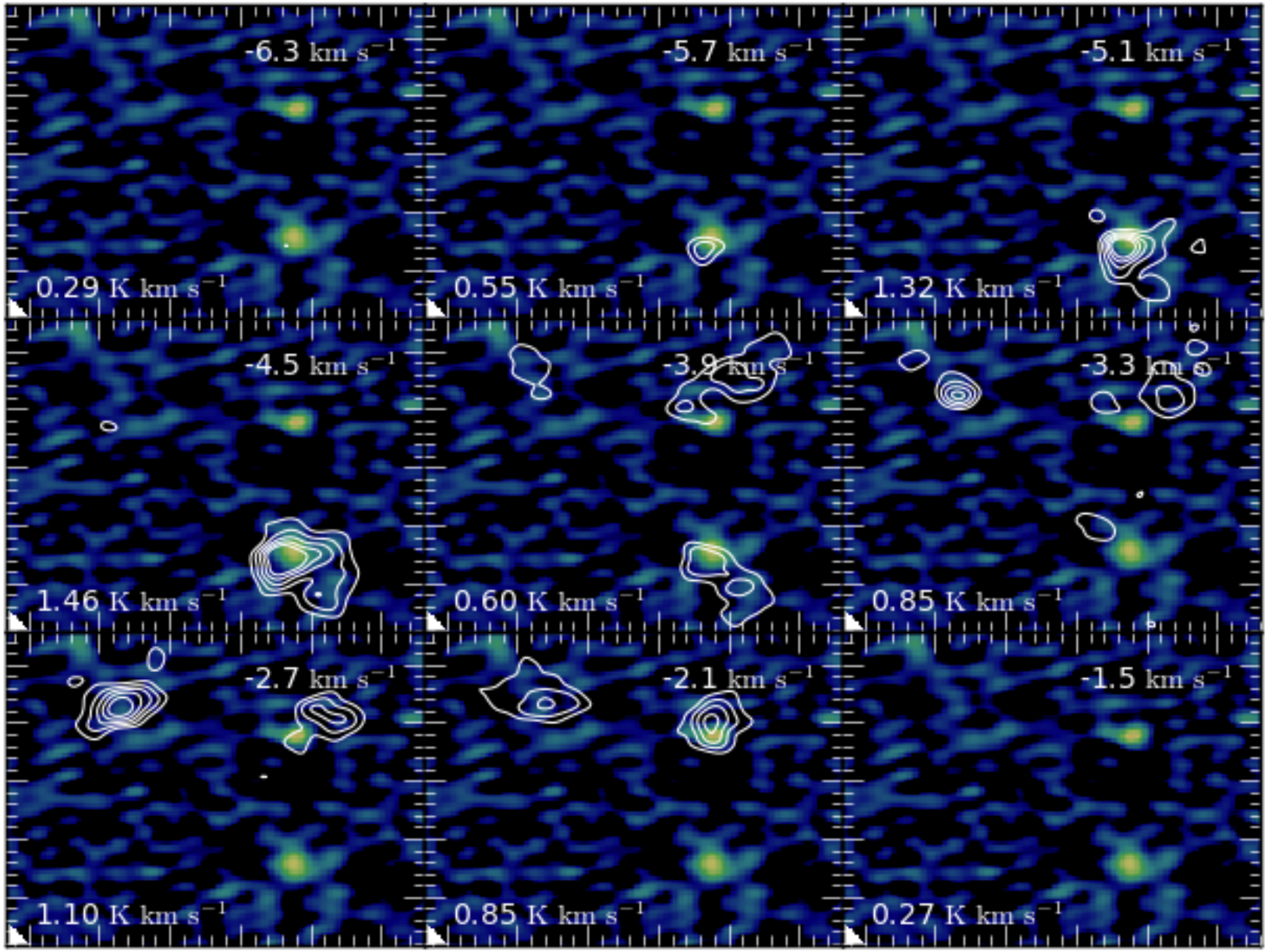


Outflow?

- Weak water maser
  - KVN positions 1 and 9



SMA 13CO


-6.3 km s^{-1}
-5.7 km s^{-1}
-5.1 km s^{-1}
0.29 K km s^{-1}
0.55 K km s^{-1}
1.32 K km s^{-1}
-4.5 km s^{-1}
-3.9 km s^{-1}
-3.3 km s^{-1}
1.46 K km s^{-1}
0.60 K km s^{-1}
0.85 K km s^{-1}
-2.7 km s^{-1}
-2.1 km s^{-1}
-1.5 km s^{-1}
1.10 K km s^{-1}
0.85 K km s^{-1}
0.27 K km s^{-1}

Point sources

	PS1	PS2	PS3
13CO	yes	yes	yes
Continuum	no	yes	yes
Scuba-2	yes	yes	yes
WISE 3.4	yes	no	yes
WISE 4.6	yes	no	yes
WISE 12	no	no	yes
WISE 22	no	no	yes
H-alpha	yes	no	no
r	yes	no	no
i	yes	no	no

Conclusions

- A massive clump capable of forming a stellar cluster
- Velocity profiles suggest streaming motions along the filaments towards the central clump
- Three point sources
  - Feeble signs of feedback
  - Different stages of evolution?