

Kinematics in Filamentary IRDCs

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Outline

I. IRDC

II. Filaments

a. Overview

b. Formation models

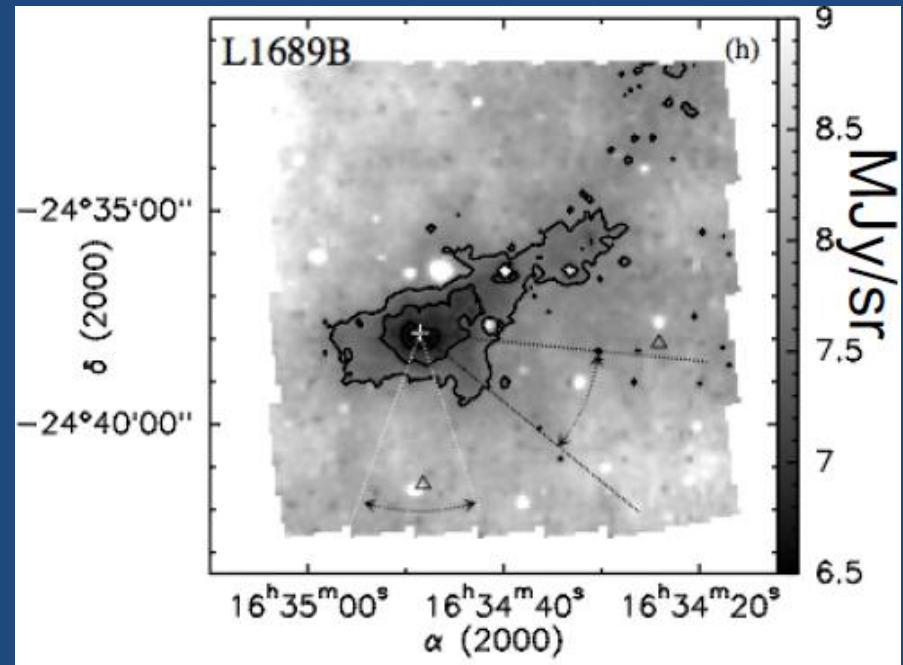
c. Kinematics

III. Summary

Infrared Dark Clouds

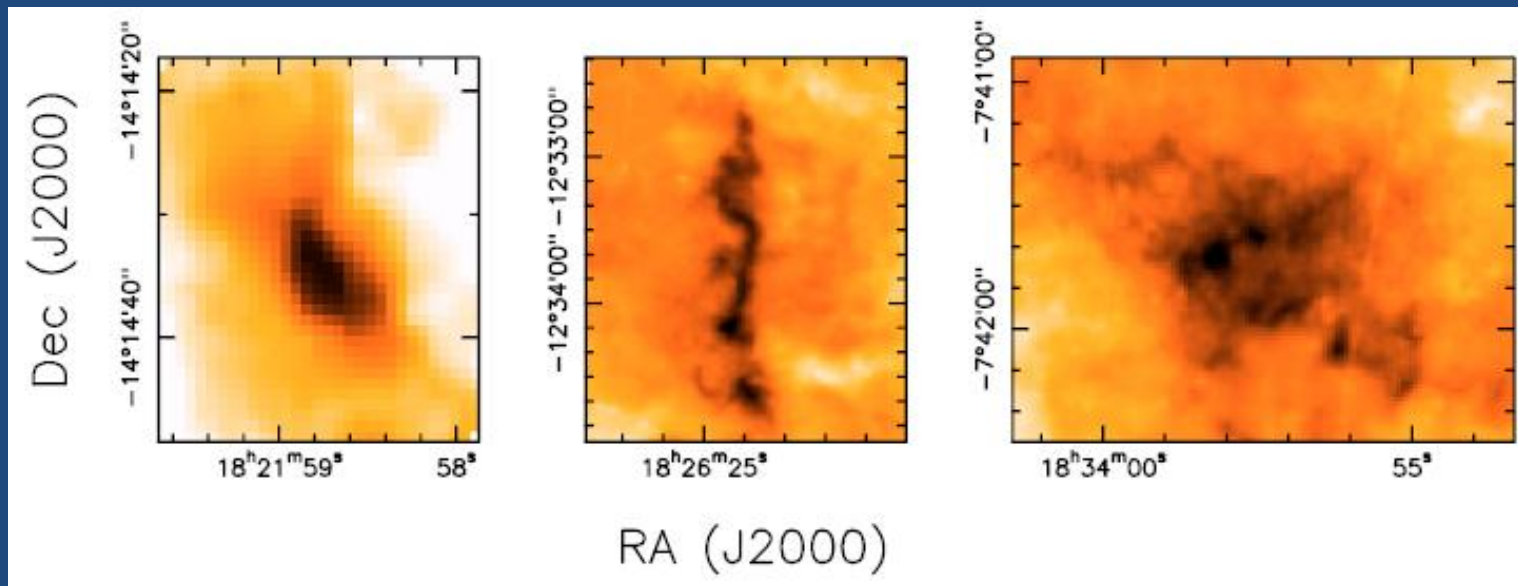
- IR silhouettes against background emission
- First detected by Perault et al (1996) with ISO
- Dense molecular clouds detected in dust continuum emission
- First stages of star formation

7 μ m ISO image
Bacmann et al. (2000)

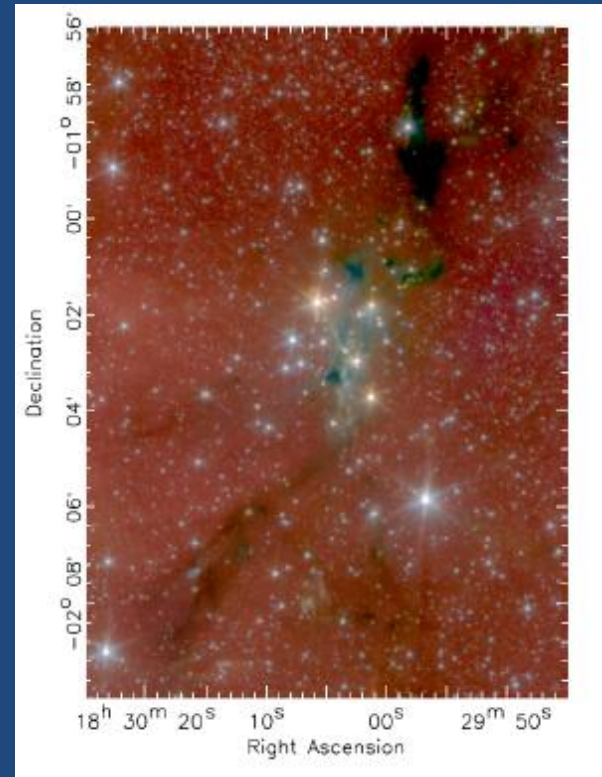


IRDC

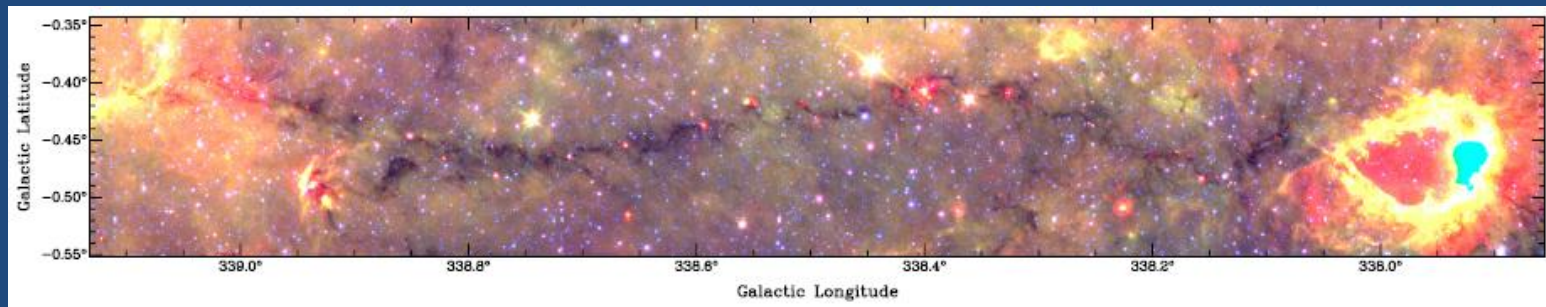
- Peretto & Fuller (2009) using GLIMPSE 8 μm data: ~11300 IRDCs.
- Lenfestey et al. in prep found ~ 4000 more in the Galactic centre.
- Boundary limit: 10^{22} $\text{N}(\text{H}_2)$ cm^{-2} .



Some IRDC show
filamentary
structure



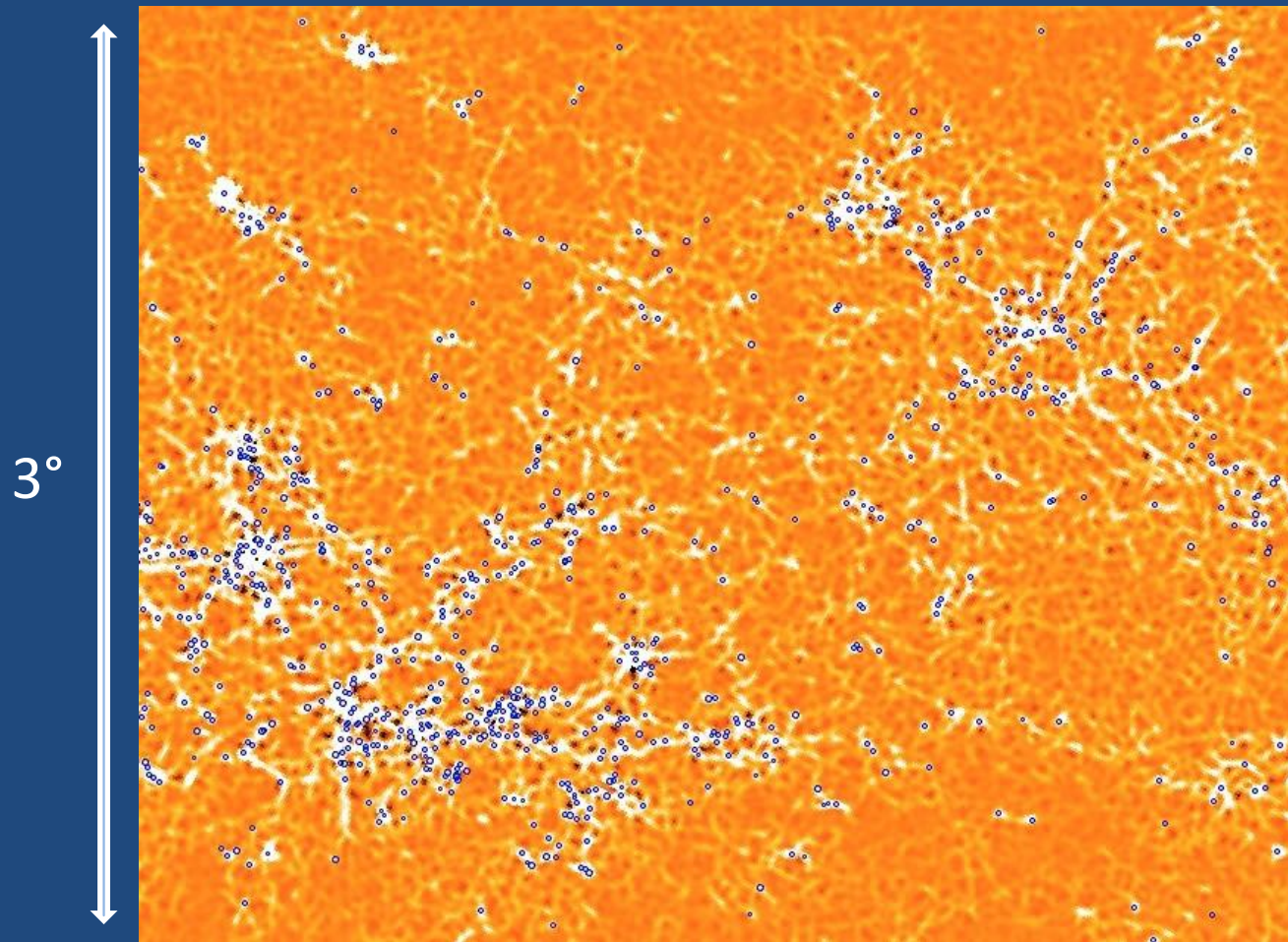
40''



1.2°

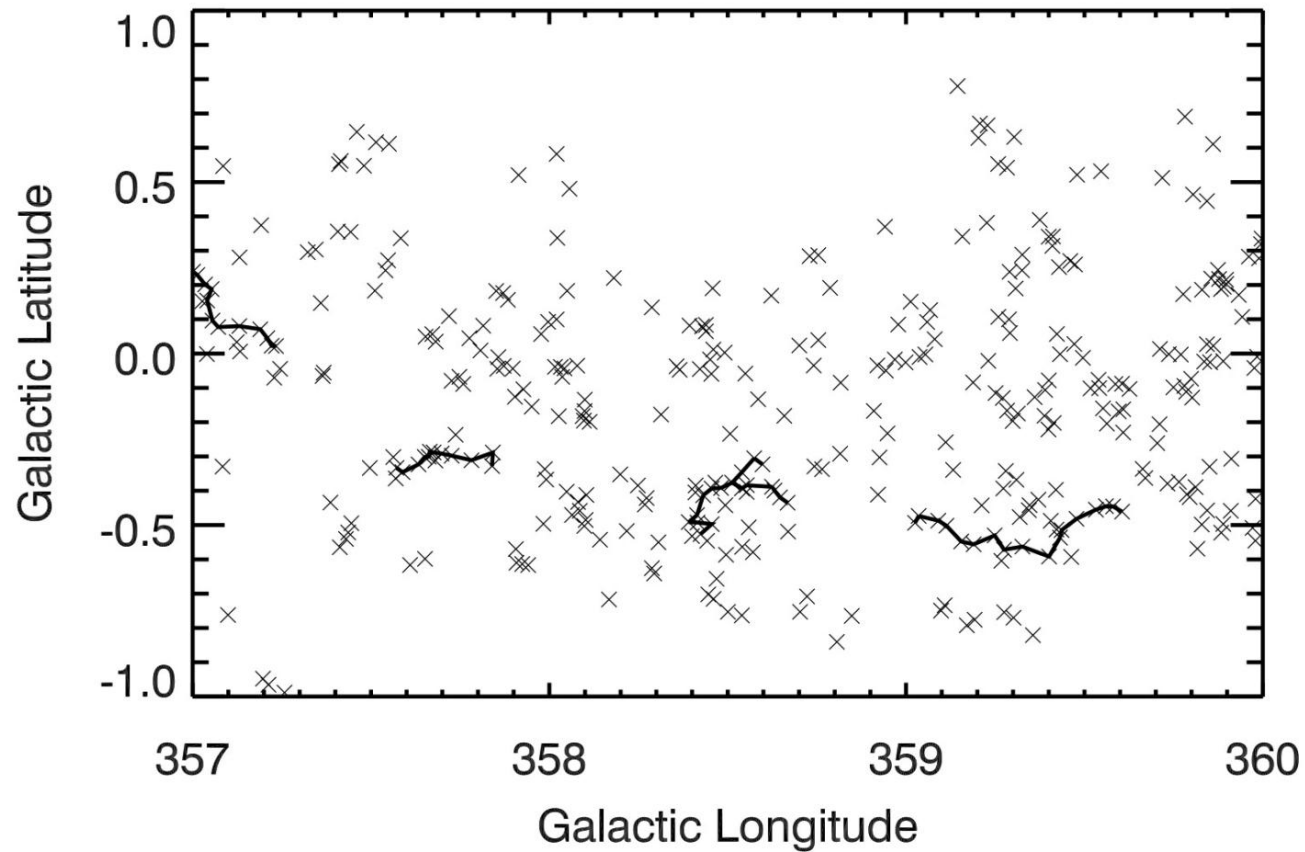
Jackson et al. (2010)

Filaments are ubiquitous

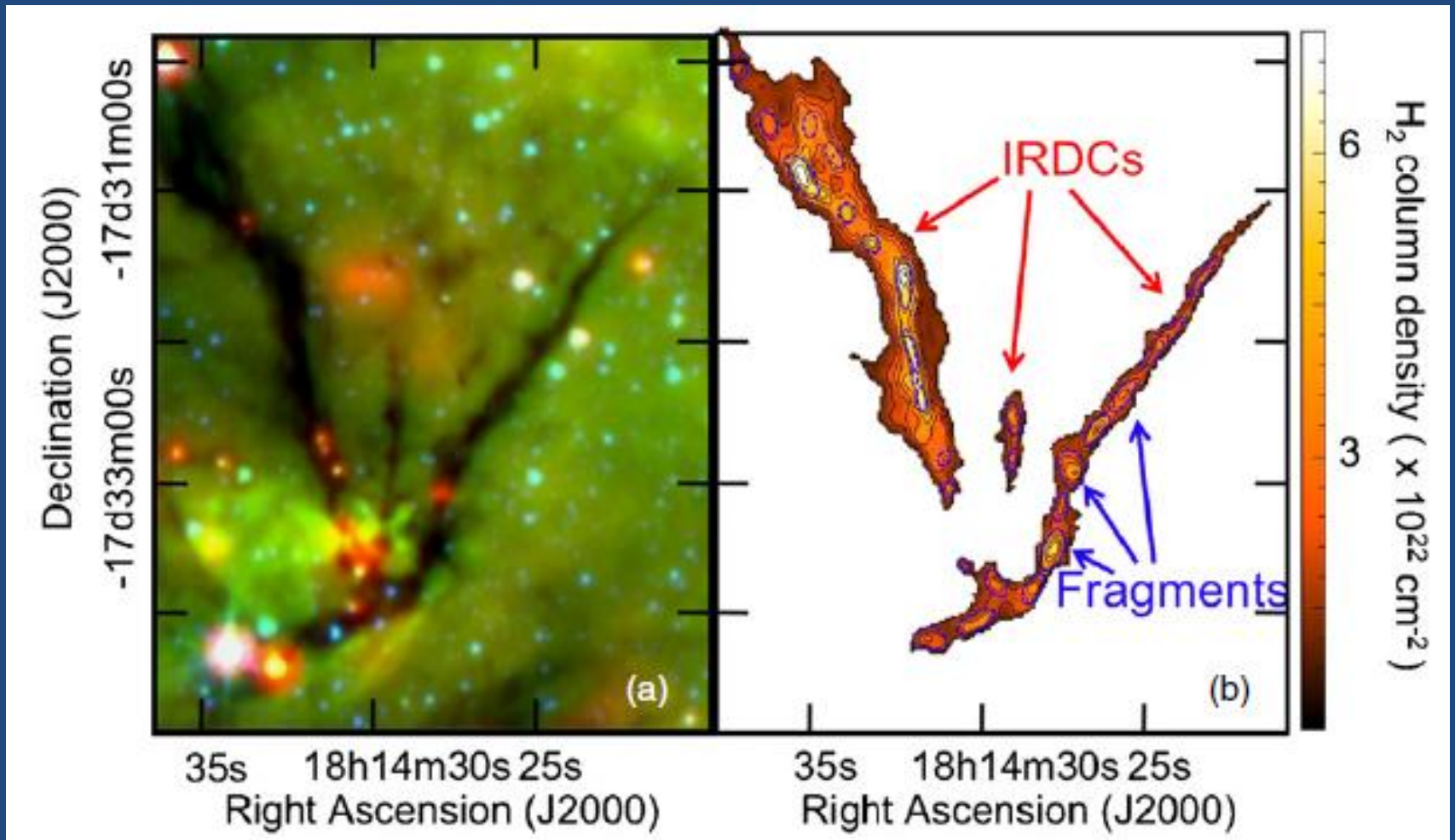


Curvelet Herschel map of $l=59^\circ$, Molinari et al. (2010)

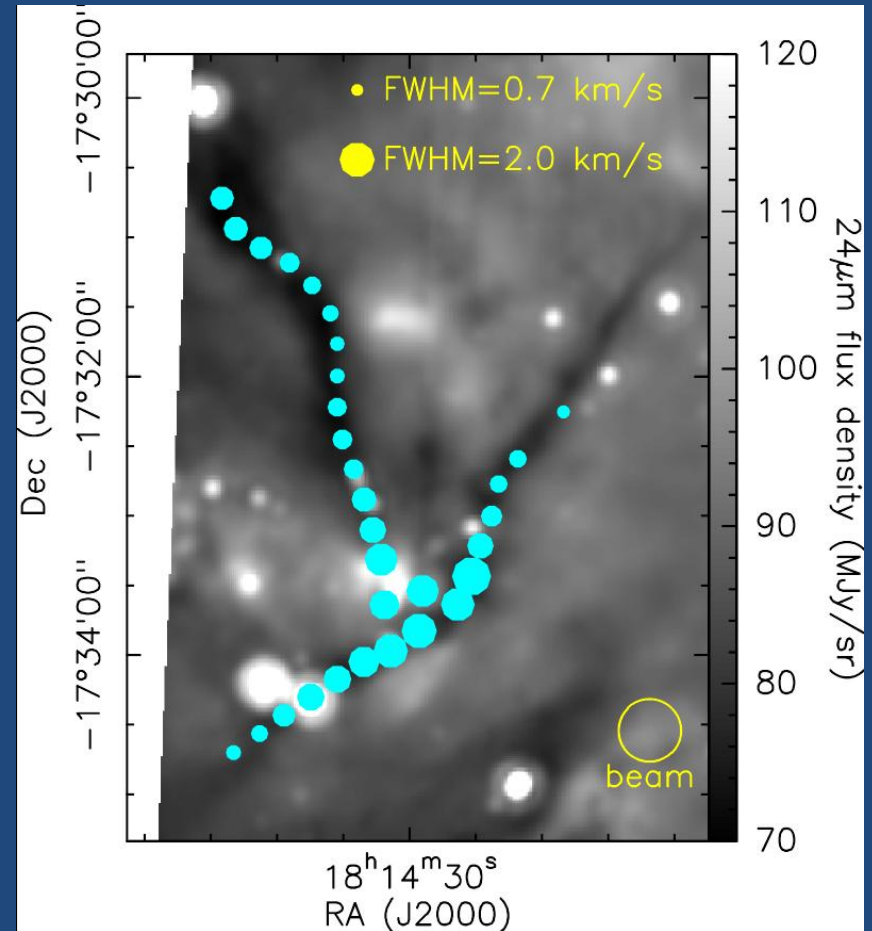
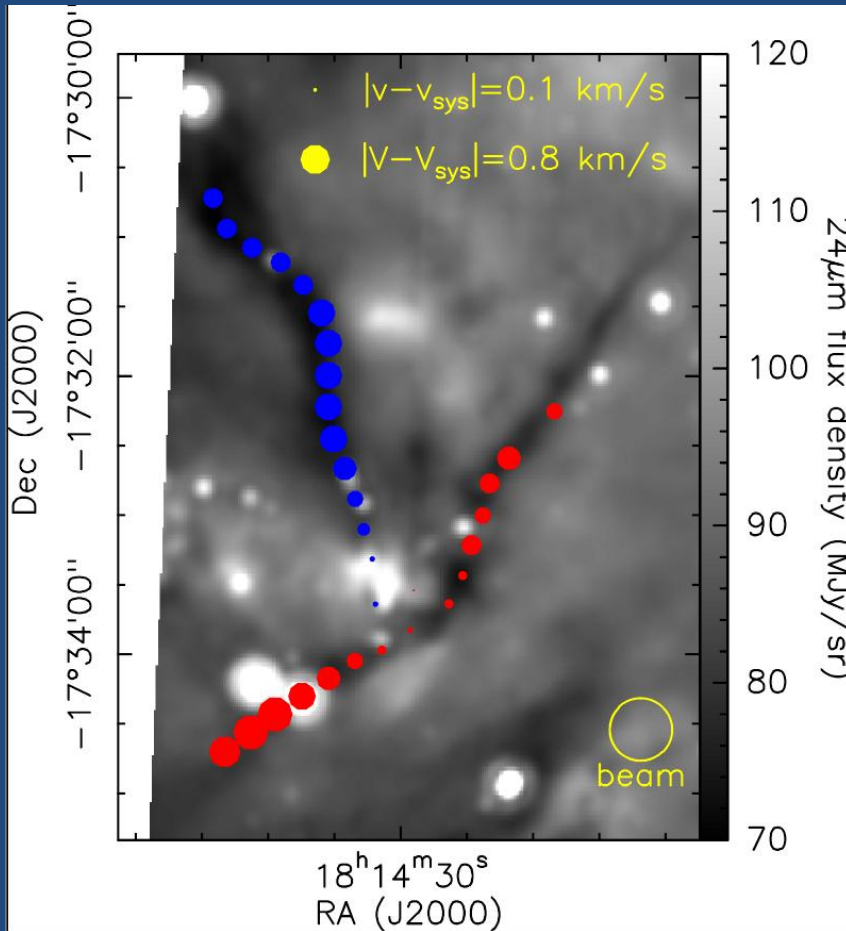
Search for larger filamentary structures



SDC13, intersecting filaments



SDC 13, IRAM 30m N_2H^+



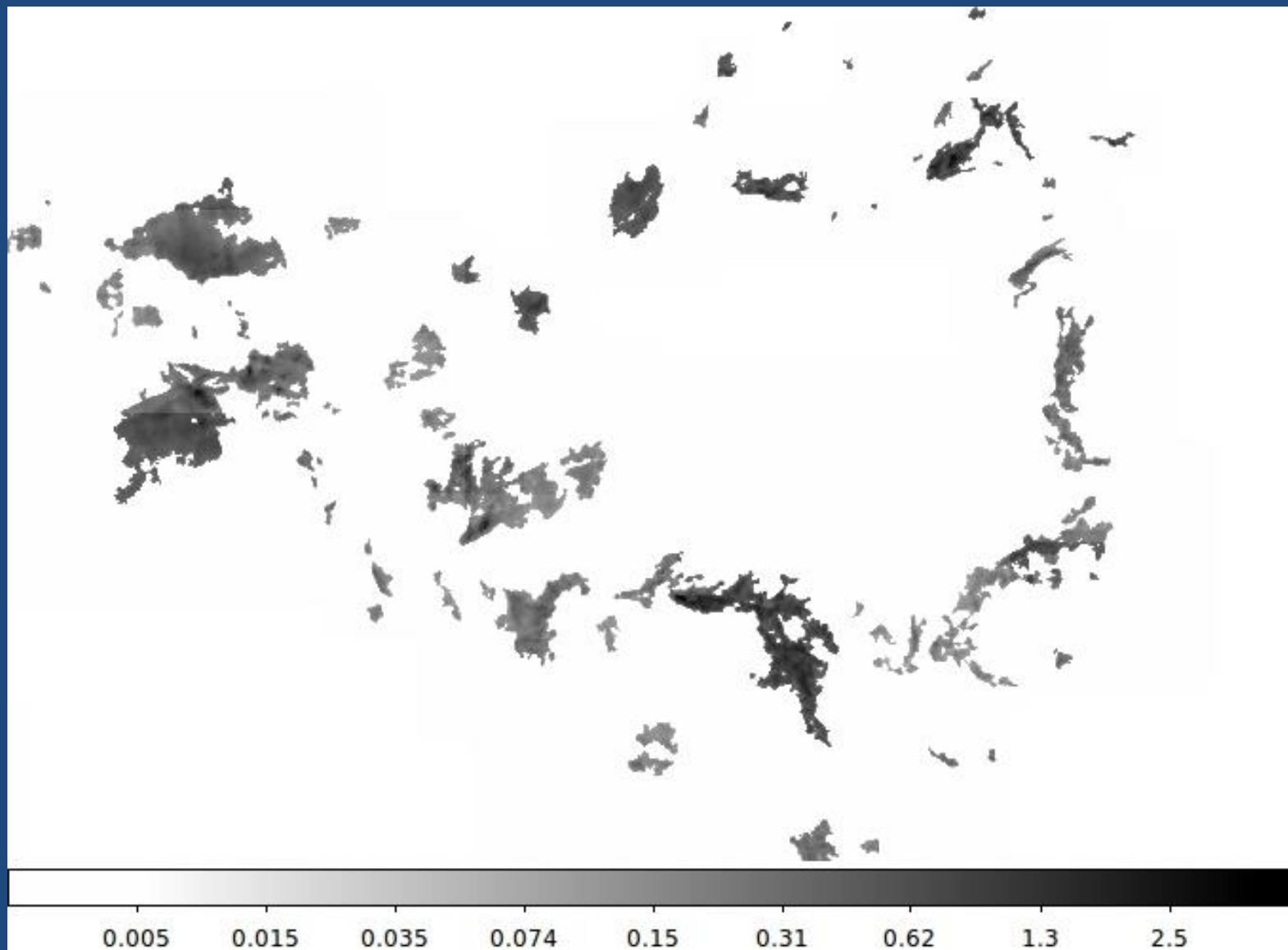
Flow in filaments common?

Mopra mapping

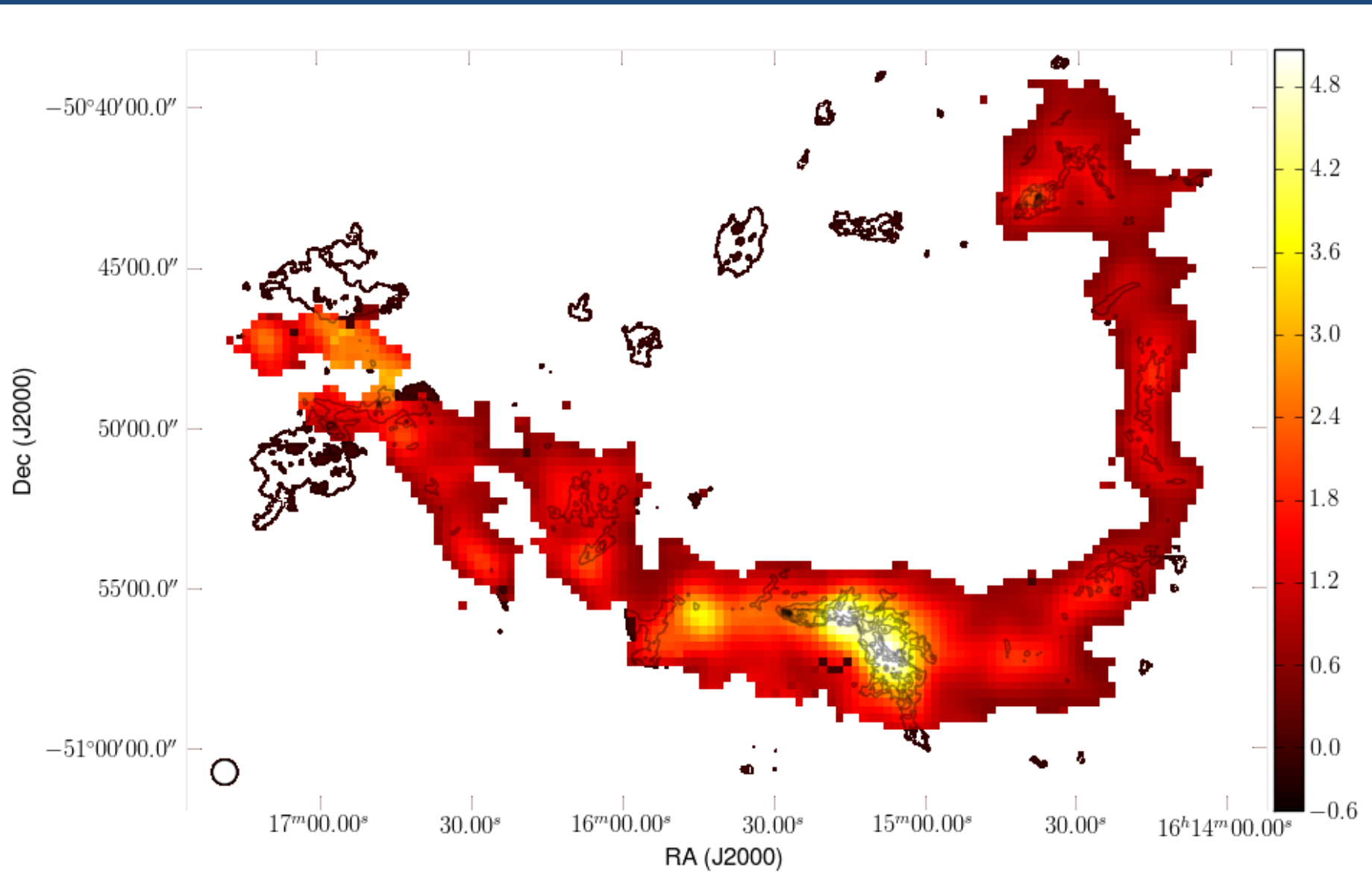
- Objectives:
 - Confirm coherence of filamentary IRDC
 - Find evidence of flows
- Mapped more than 15 molecules, like ^{12}CO , ^{13}CO , C^{18}O , HNC , HCN , N_2H^+ .
- 3 structures already mapped.
- 15 more scheduled for July.



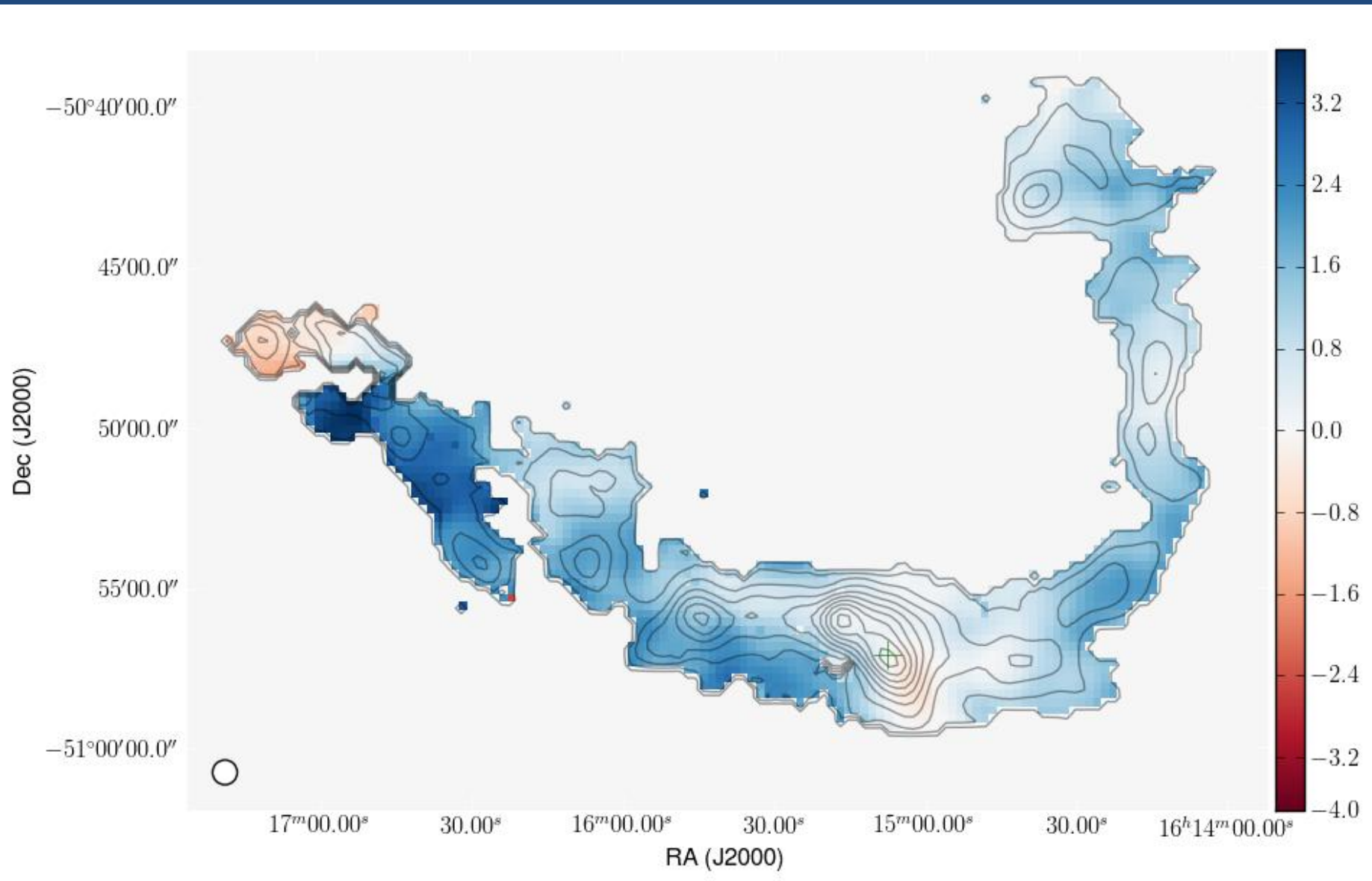
I332, composite map of IRDCs



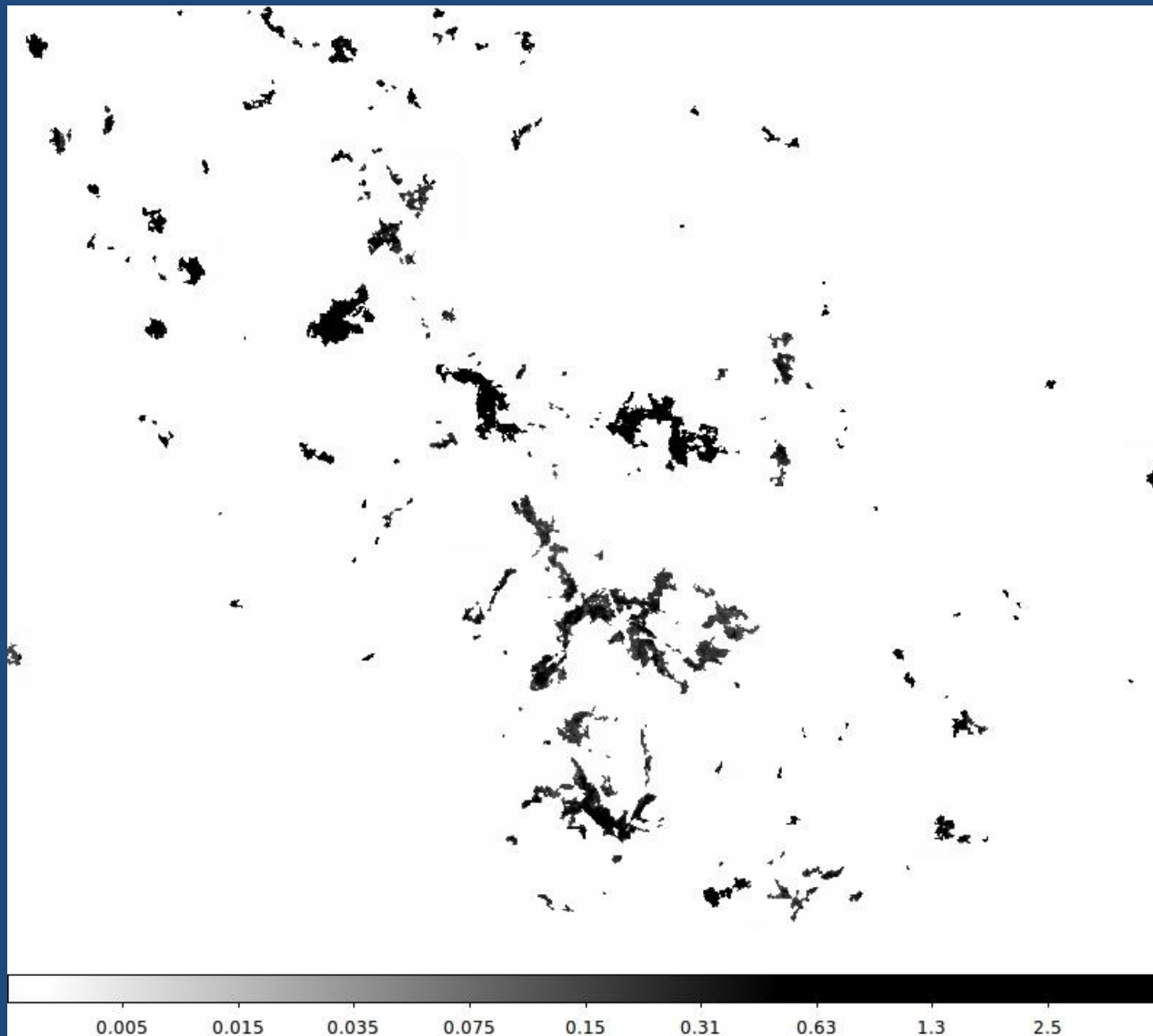
I332, HNC dense gas tracer



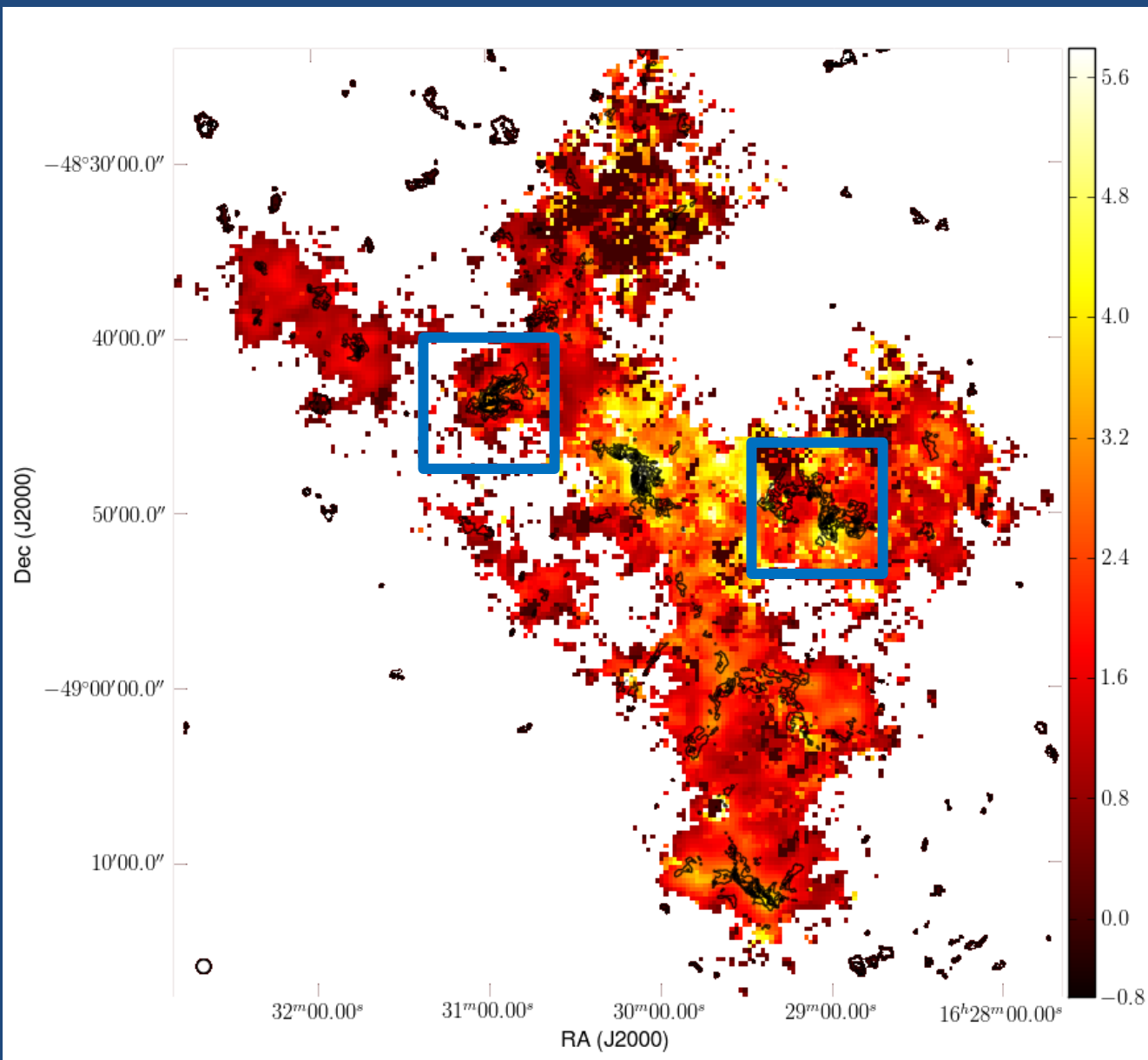
I332, offset velocity map



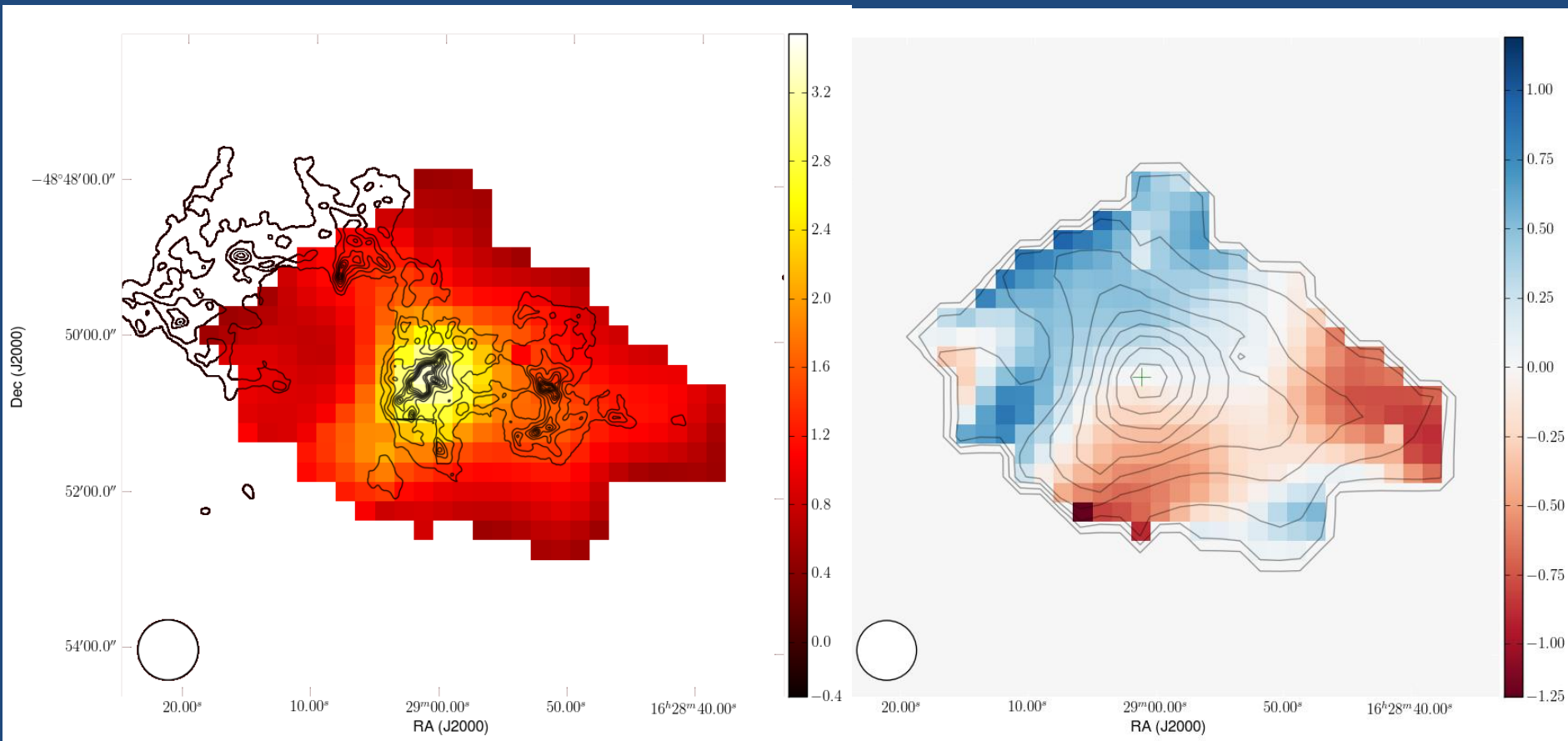
1336



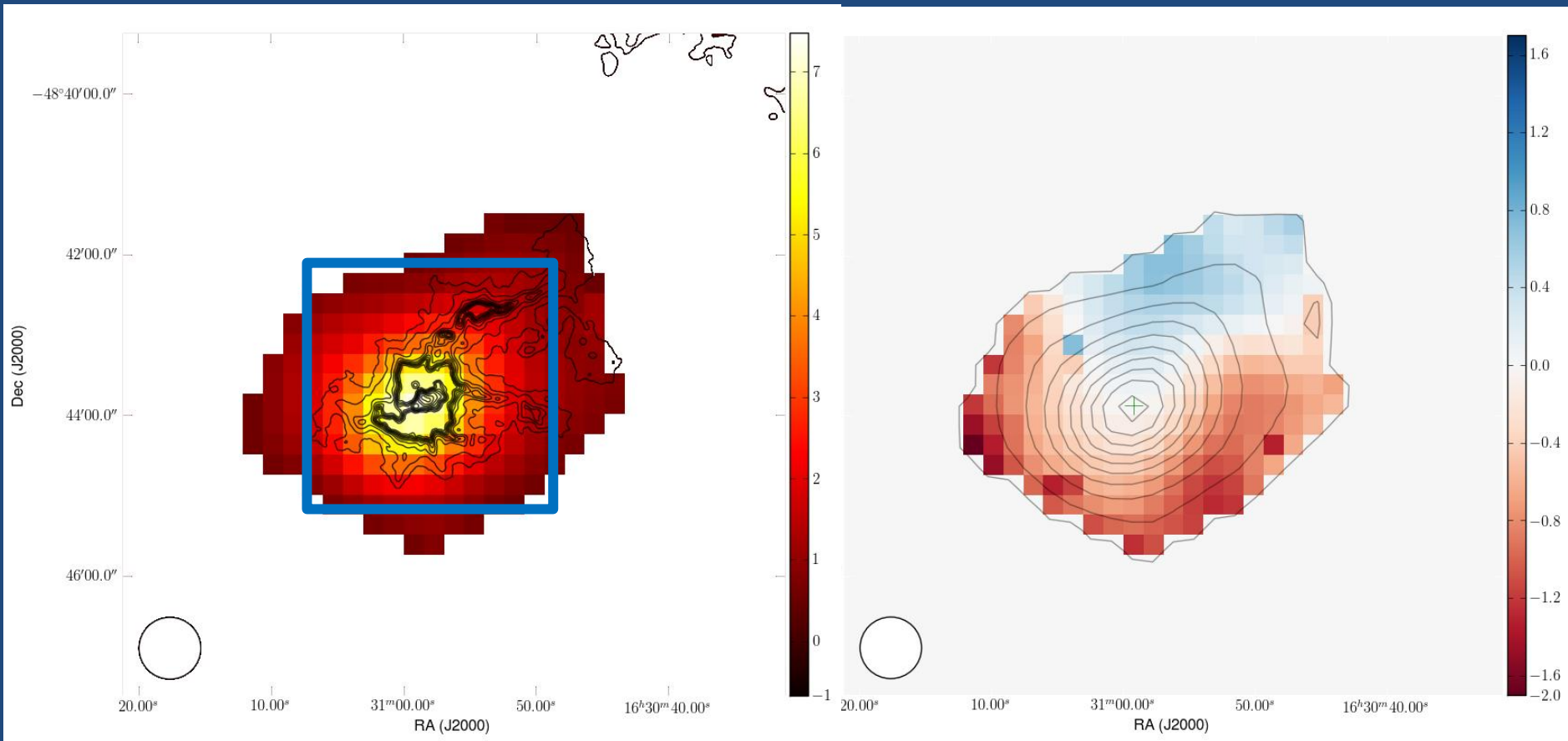
1336



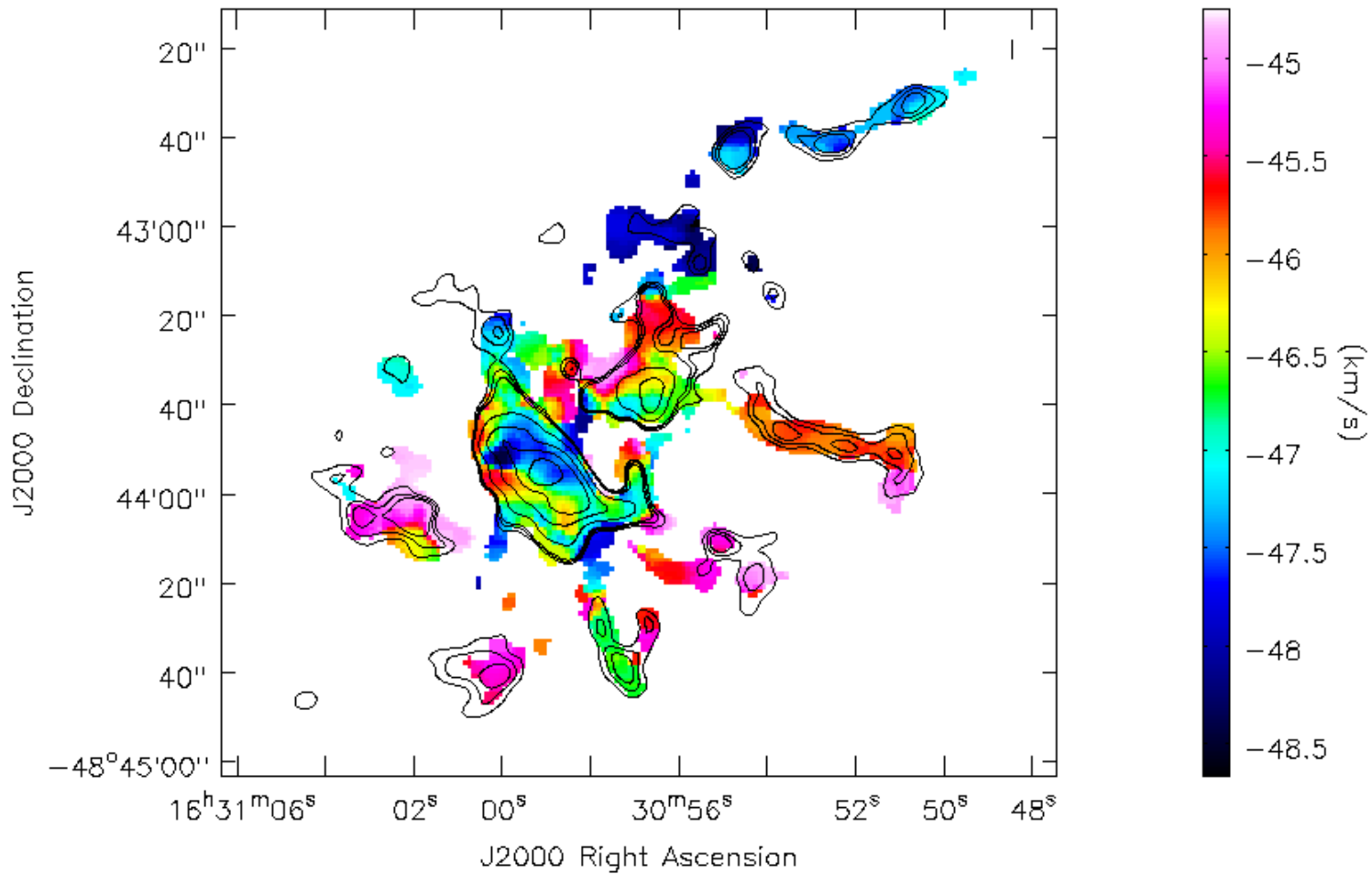
I336, HNC, c1



1336, c2



ALMA, N_2H^+



Summary

- Filaments are ubiquitous.
- Kinematics necessary to confirm coherent structures.
- We mapped 3 regions to confirm filaments.
- Some bright individual cores form at interface of 2 velocity components.
- 12-15 more maps to come.
- ALMA necessary to understand the central regions.