Are the physical processes shaping molecular clouds affecting disk formation and evolution?

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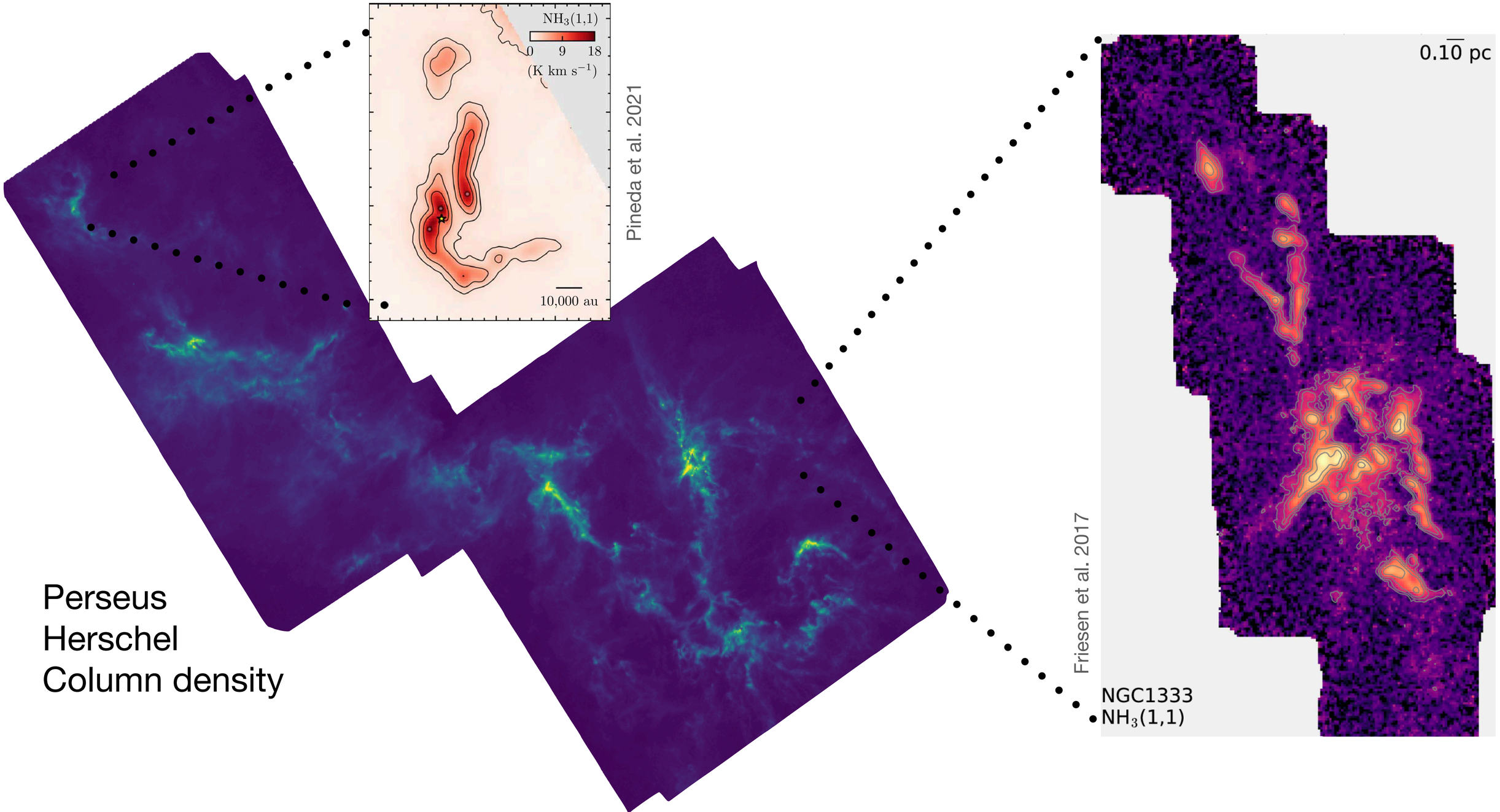
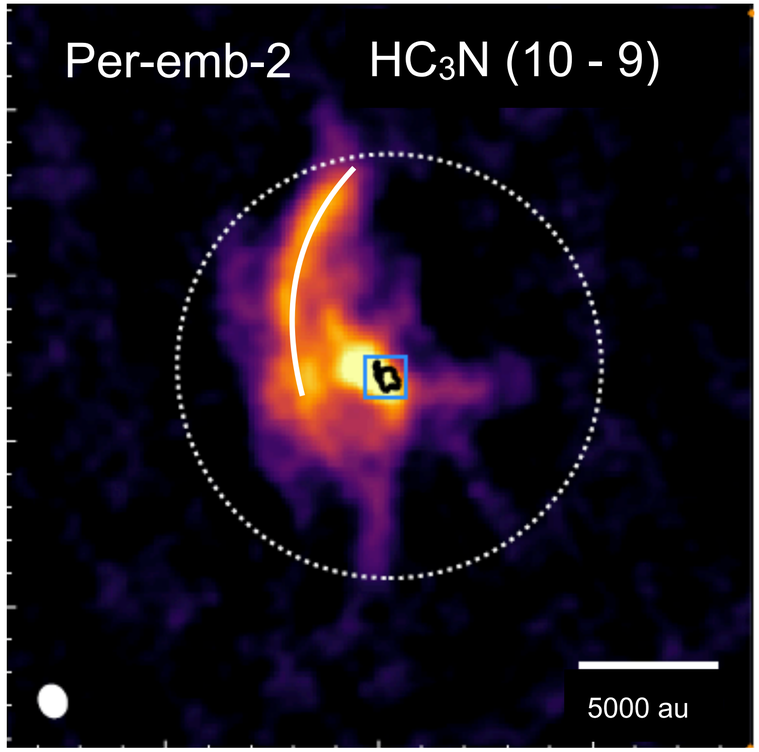
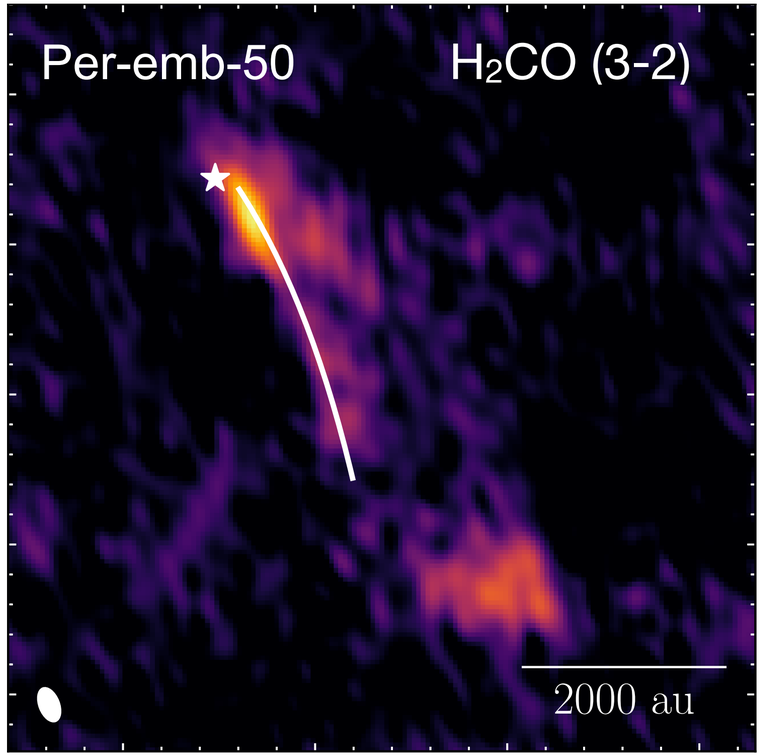
Star formation is an complex, multi-scale phenomenon



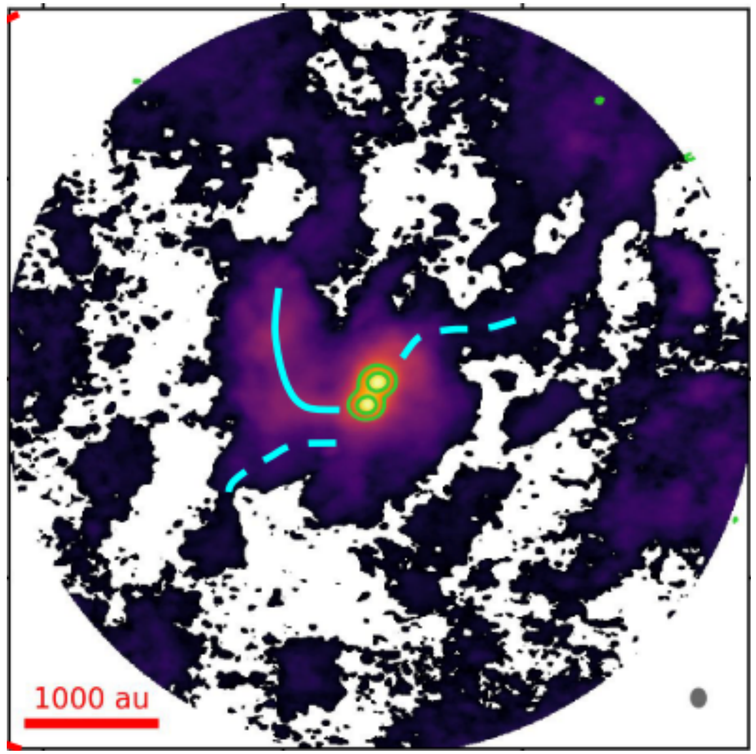
Streamers guide infall toward disks



Pineda et al. 2020



Valdivia-Mena et al. 2022



Gupta et al. 2023

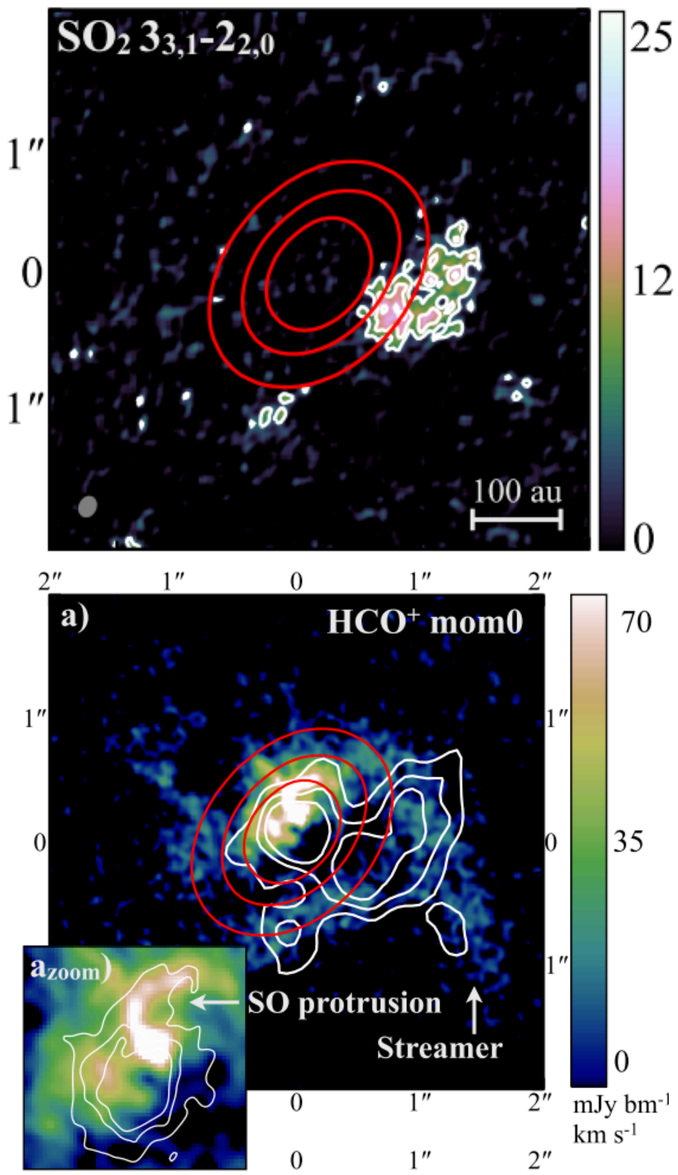
Class 0 Class I Class II

100 to 10 000 au (0.0005-0.05 pc) length structures

Bring material to the disk and protostar probably from outside the original core

=> Connection between disks and their local environment

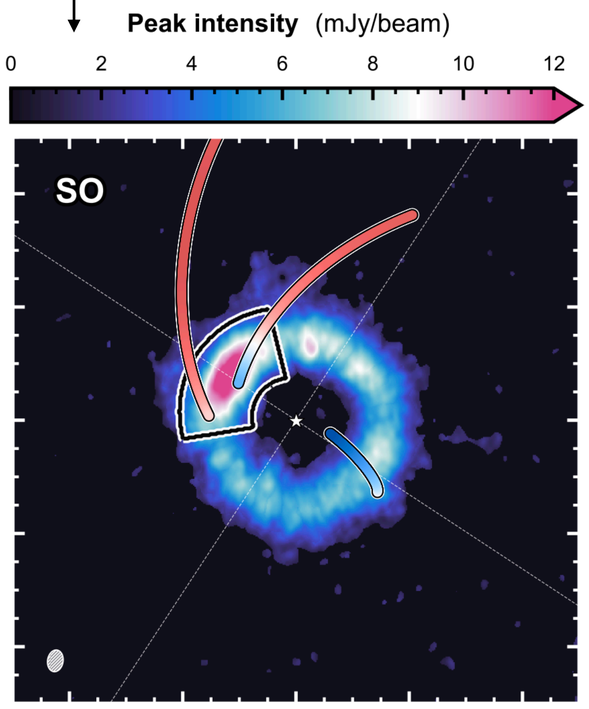
Streamers deliver material to disk scales (~100 au)



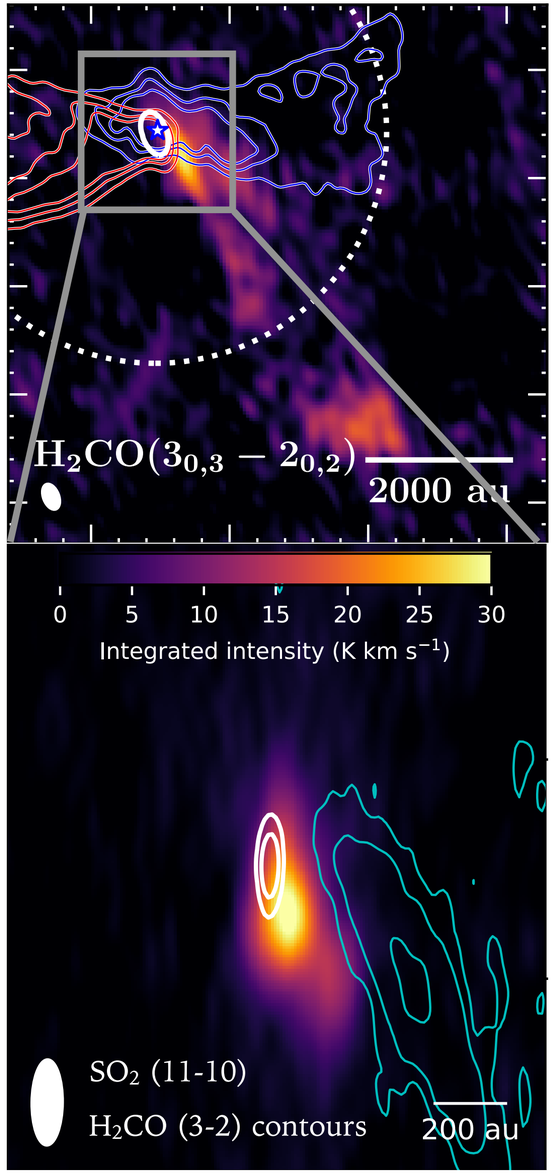
Garufi et al. 2022

Inner envelope shocks

Disk shocks



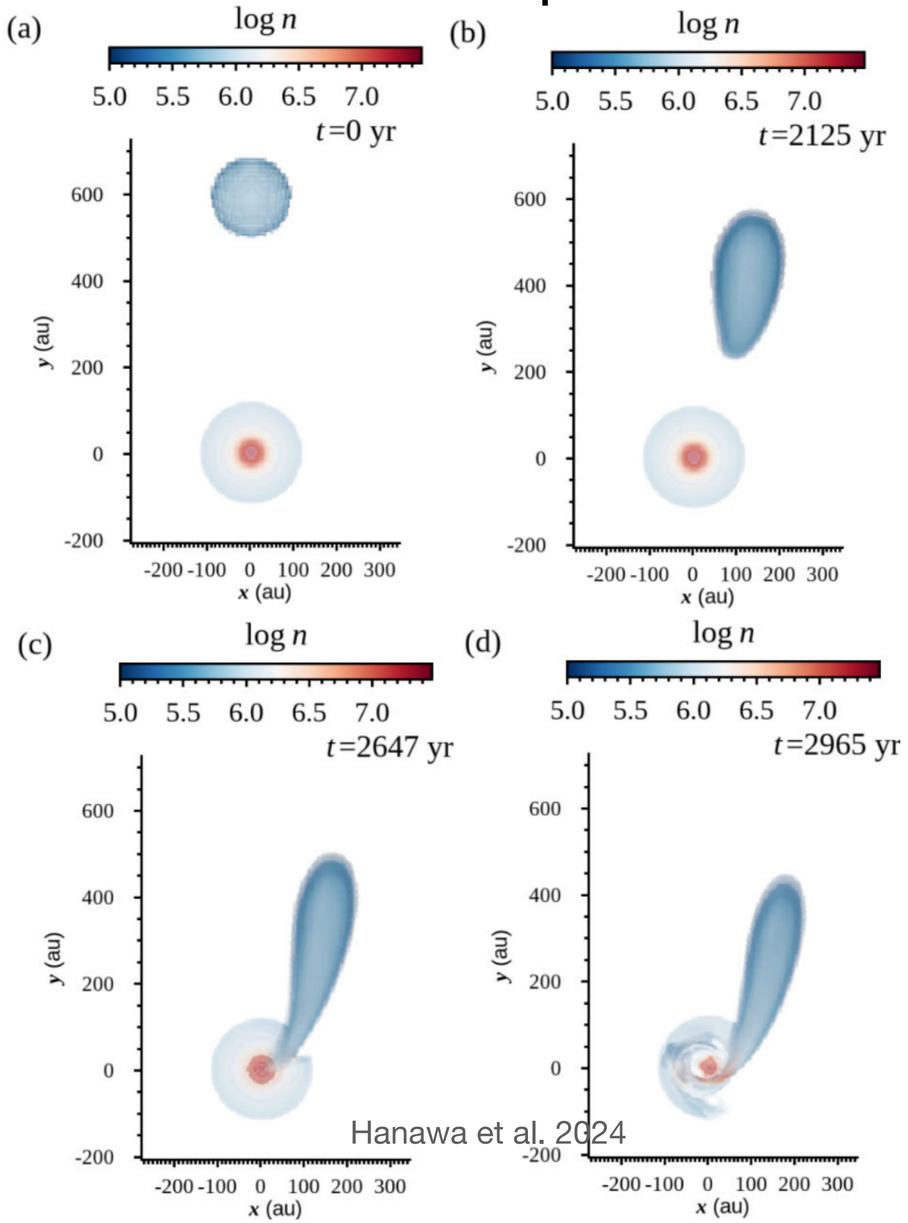
Speedie et al. 2025



Valdivia-Mena et al. In prep.

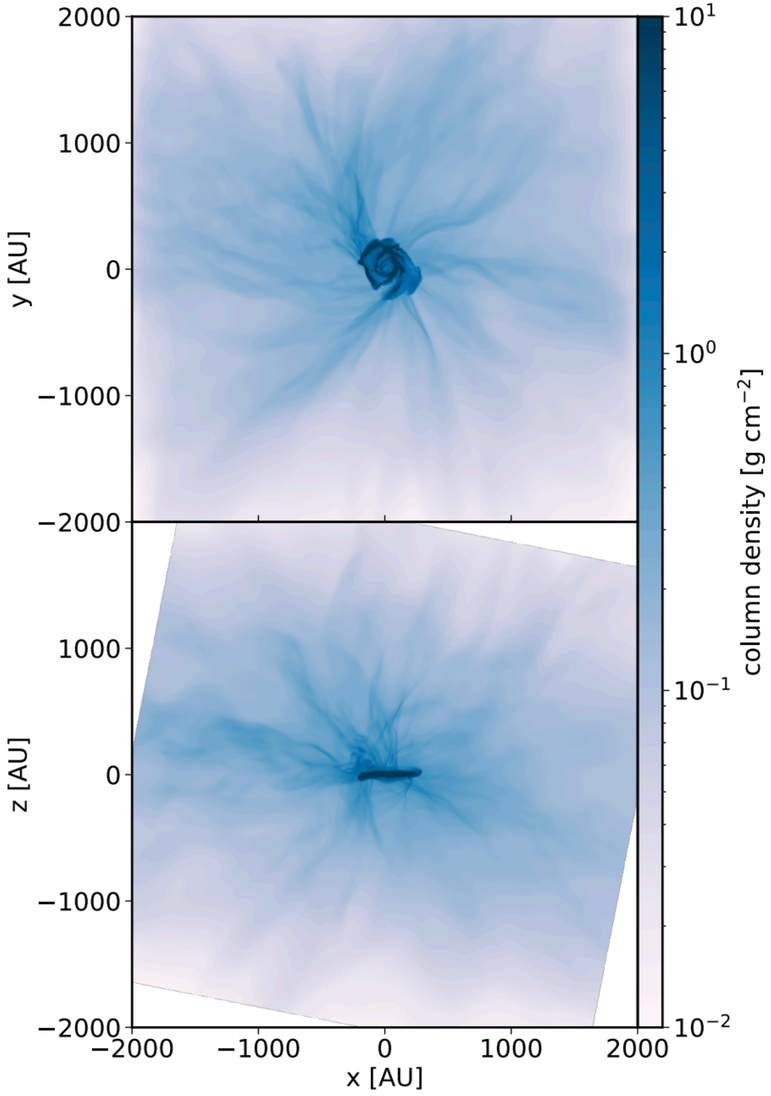
How might streamers form?

Cloudlet capture



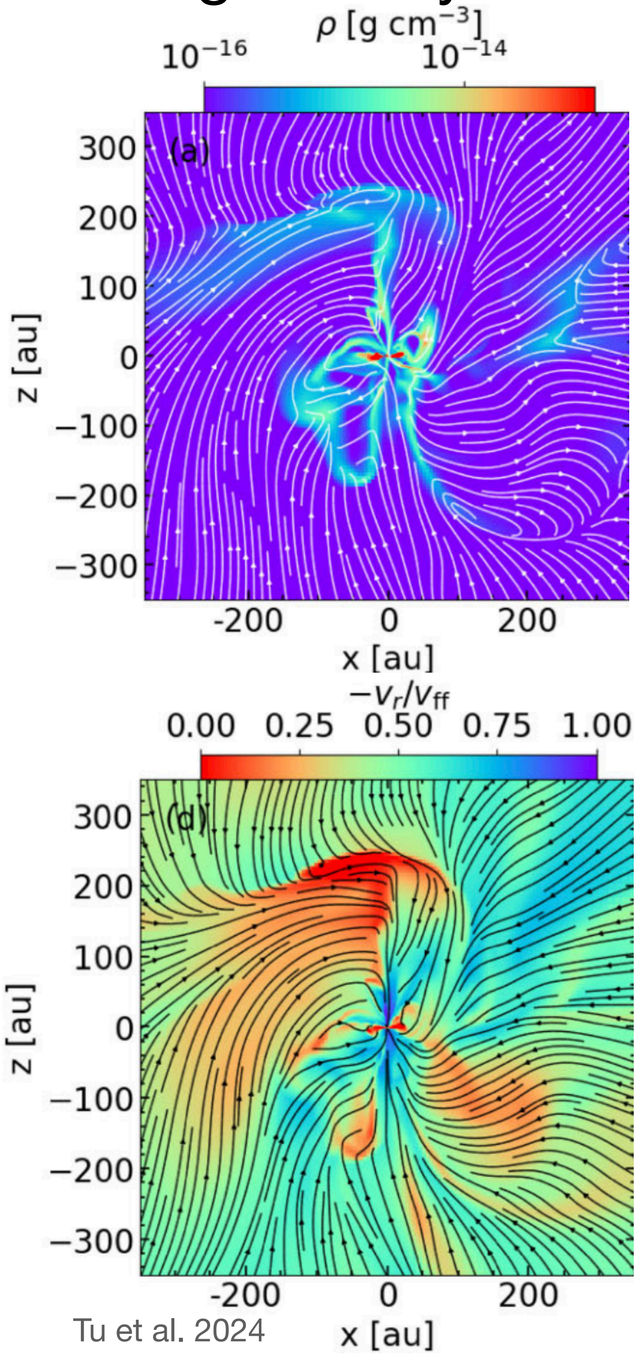
Hanawa et al. 2024

Core/filament origin



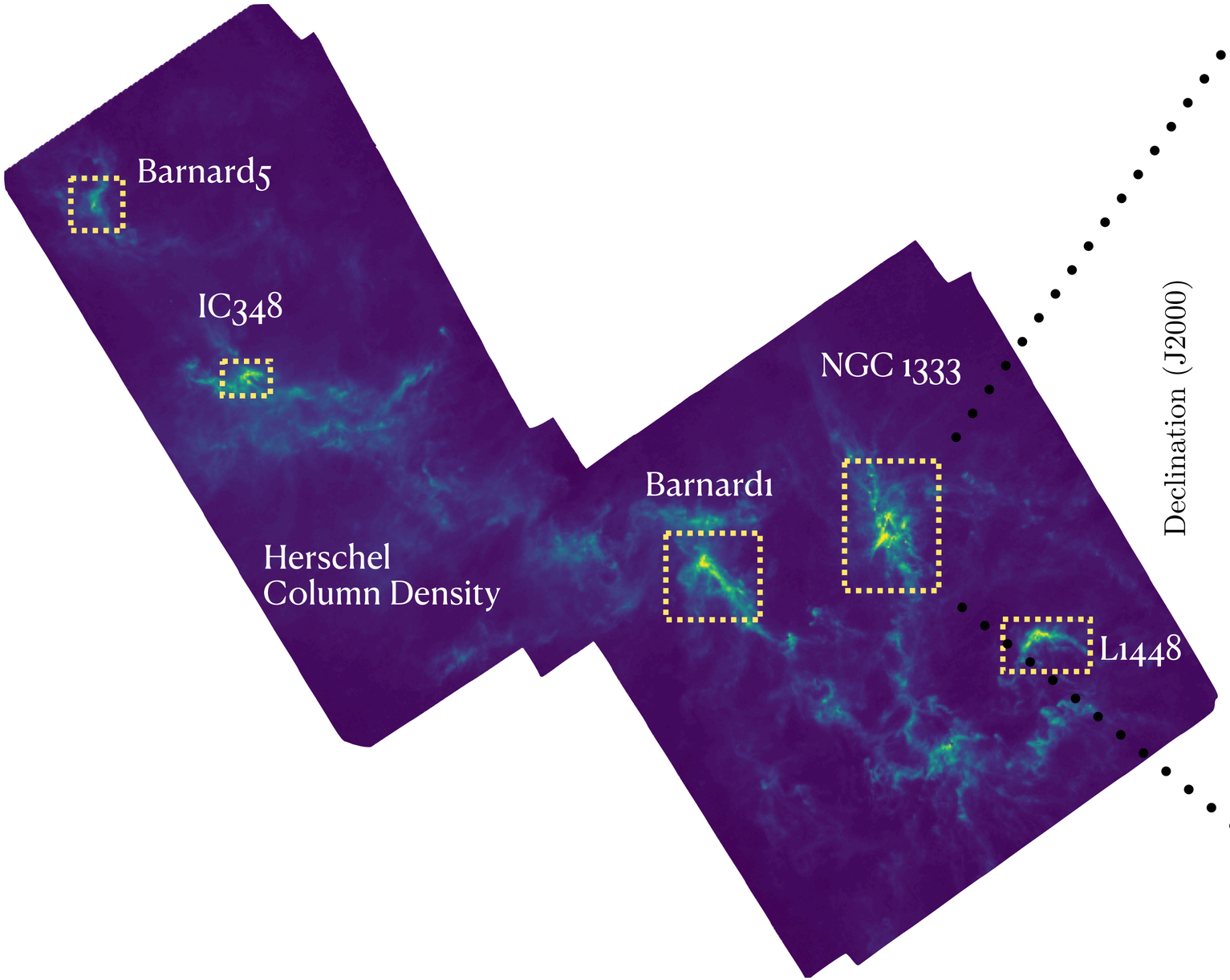
Heigl et al. 2024

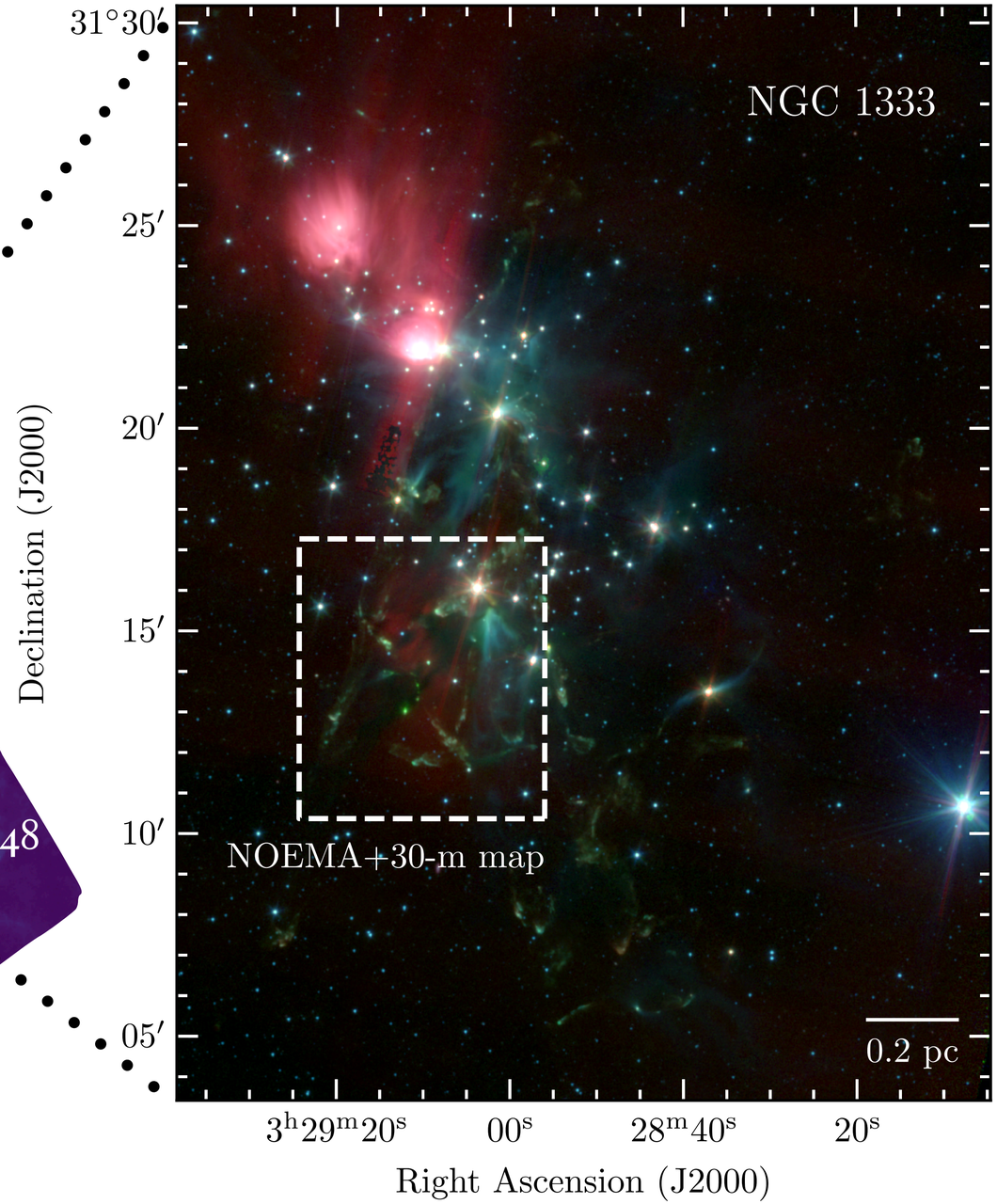
Magnetically driven



Tu et al. 2024

The case of NGC 1333

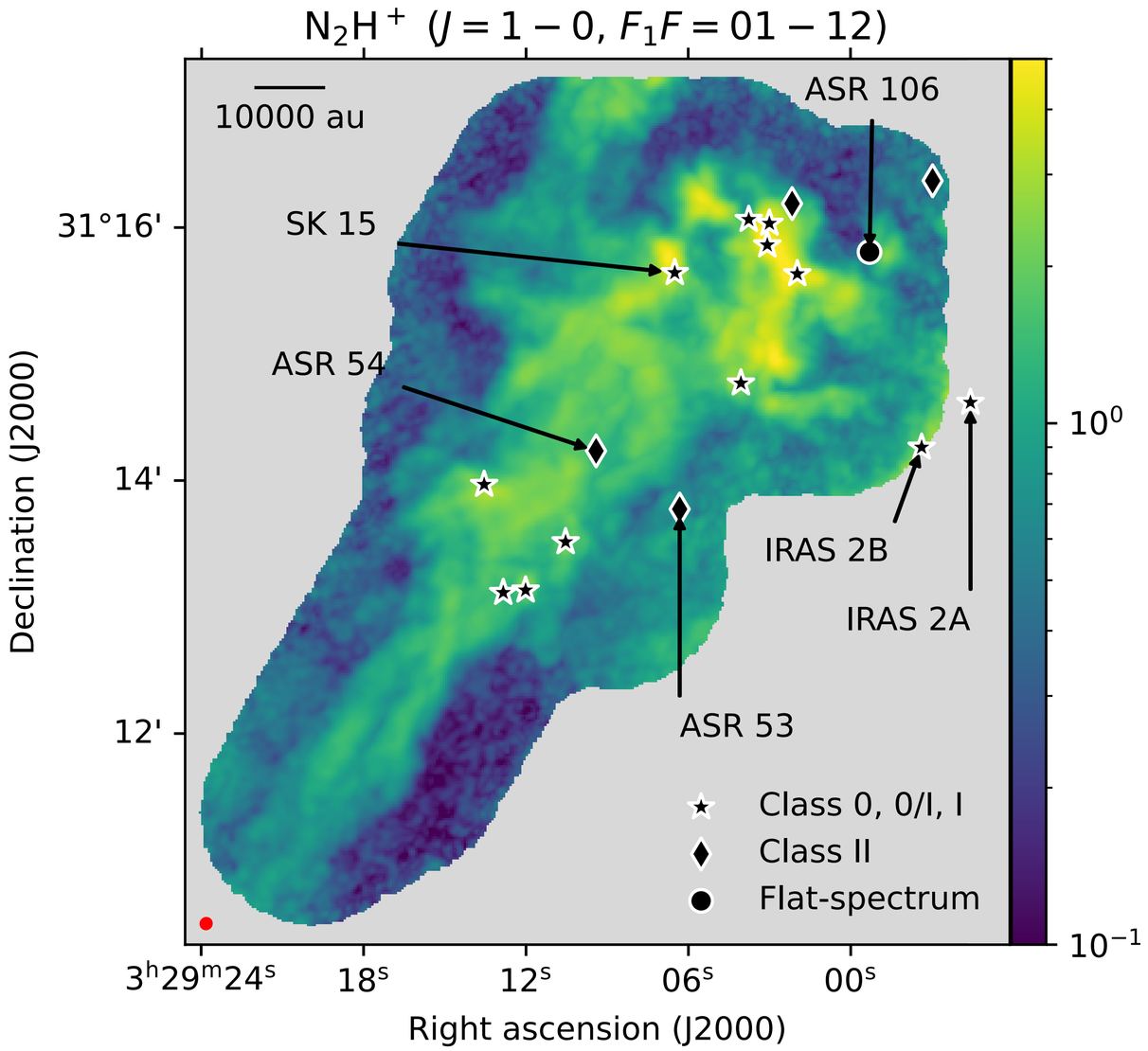




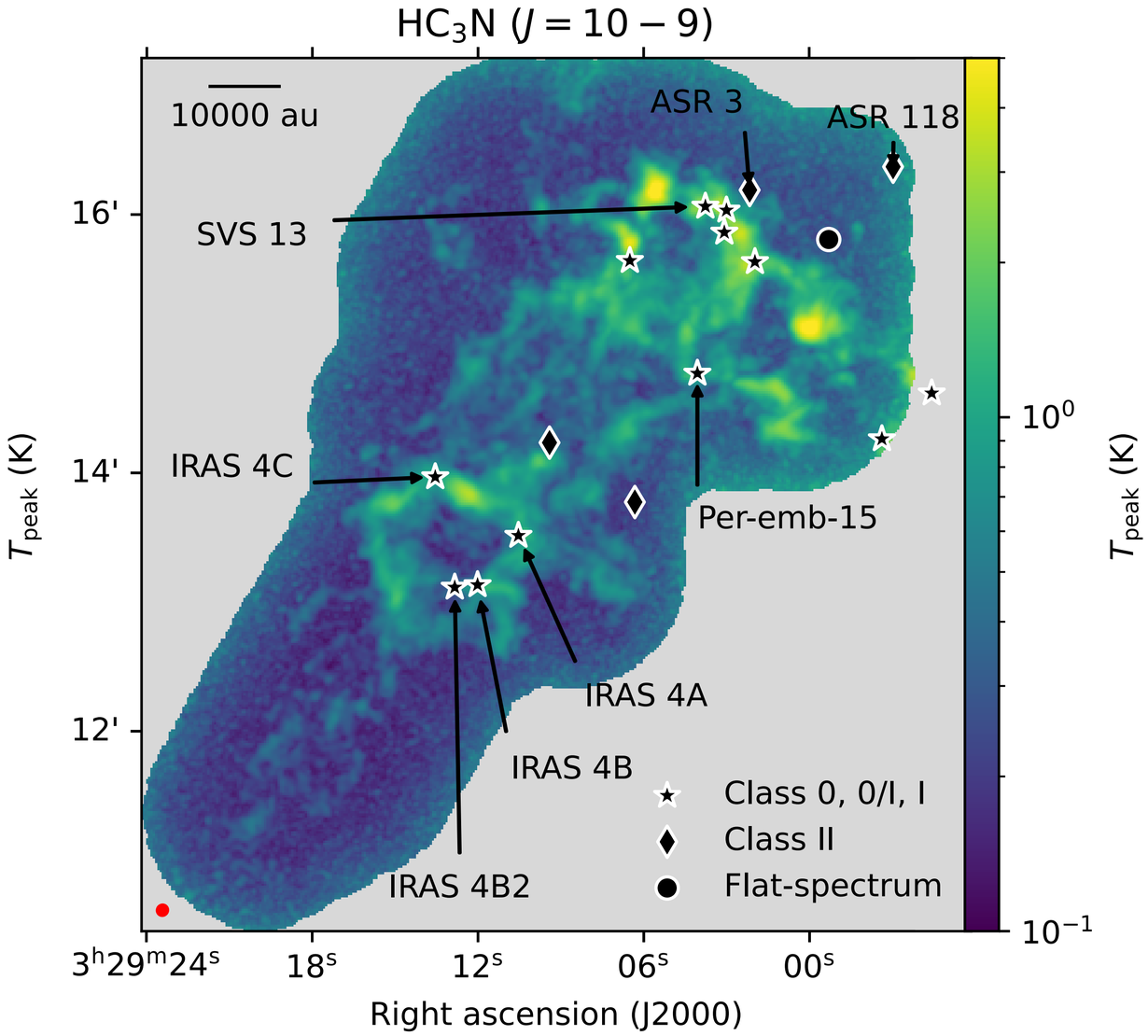
The case of NGC 1333

~60% embedded protostars have streamer candidates

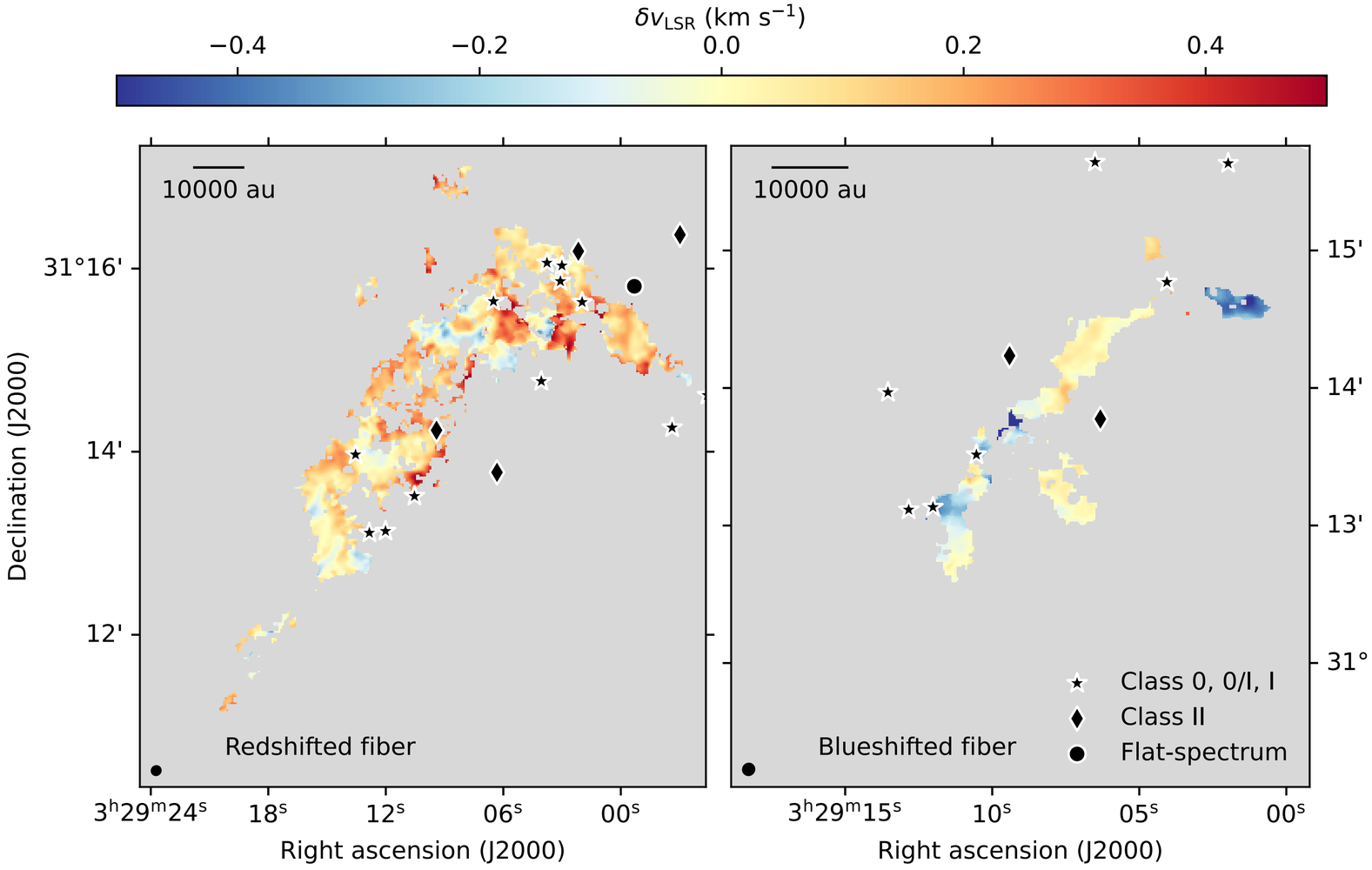
Filament tracer

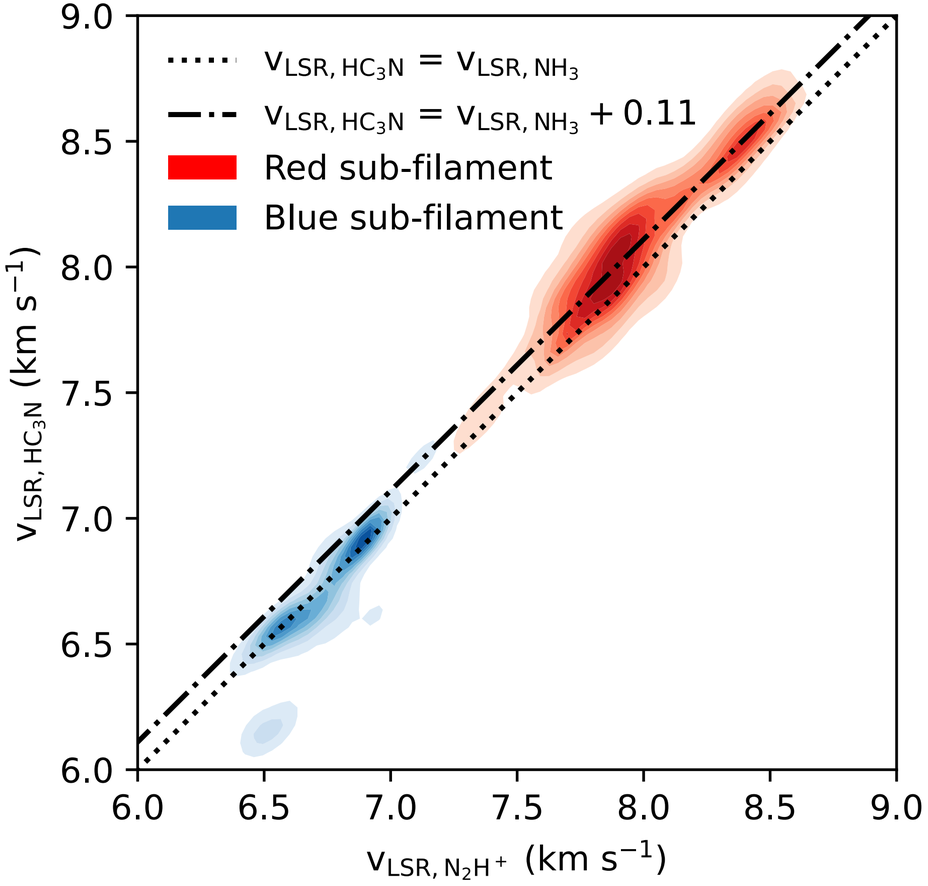


Streamer tracer



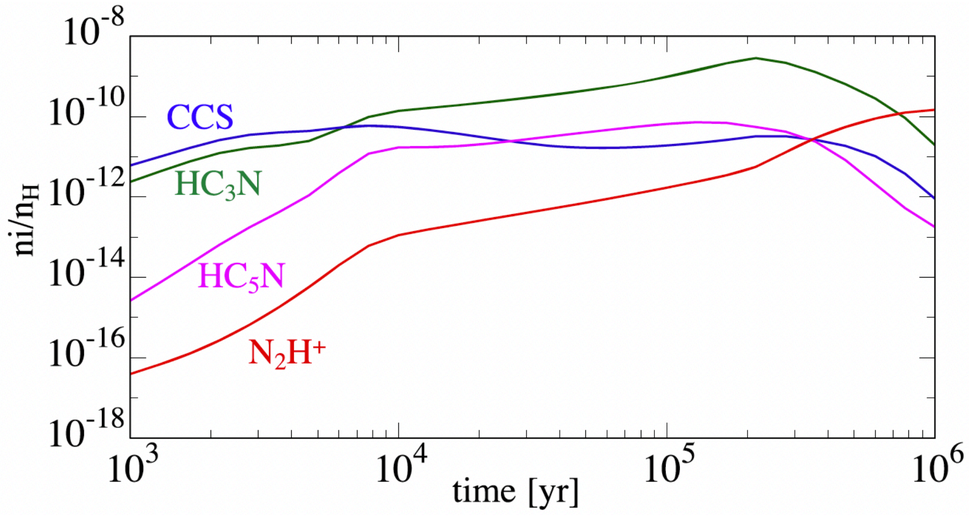
The case of NGC 1333



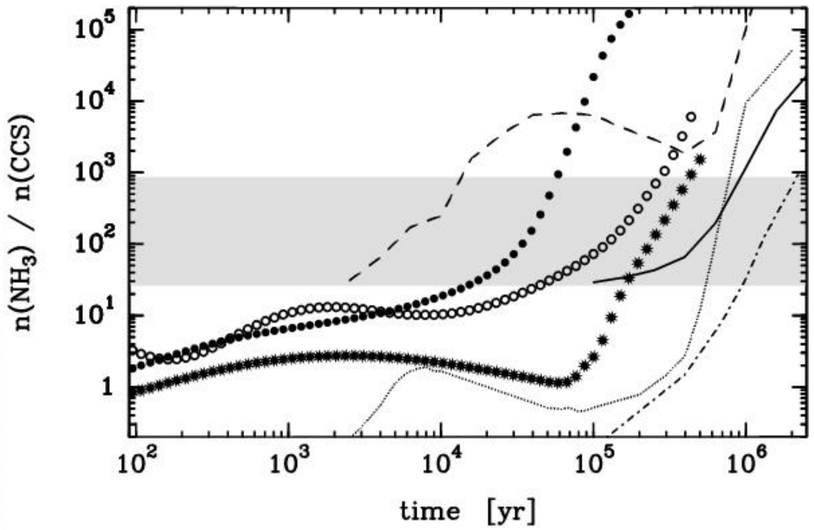


Streamers did not originate from the filament gas

Streamers are "Young"

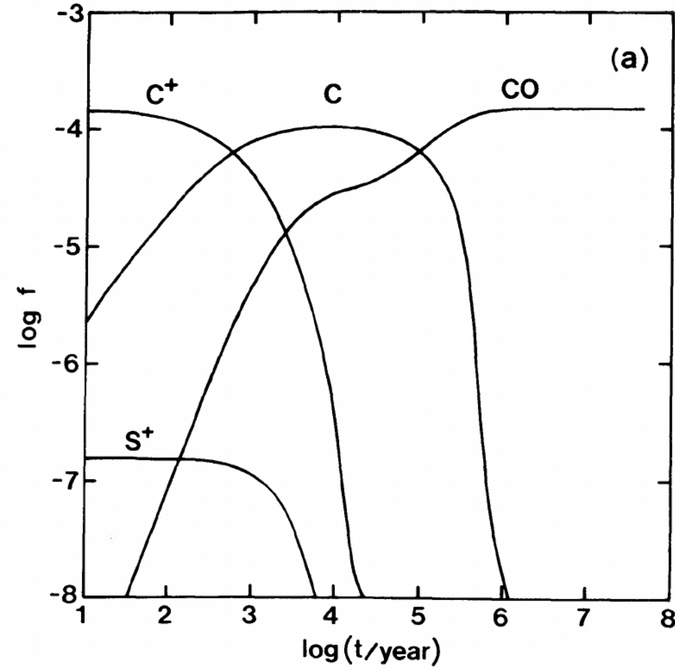


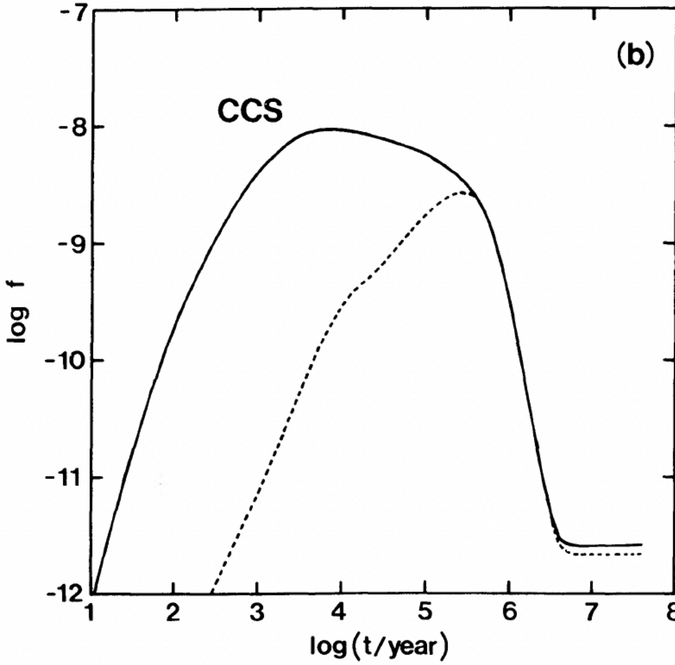
Taniguchi+2024



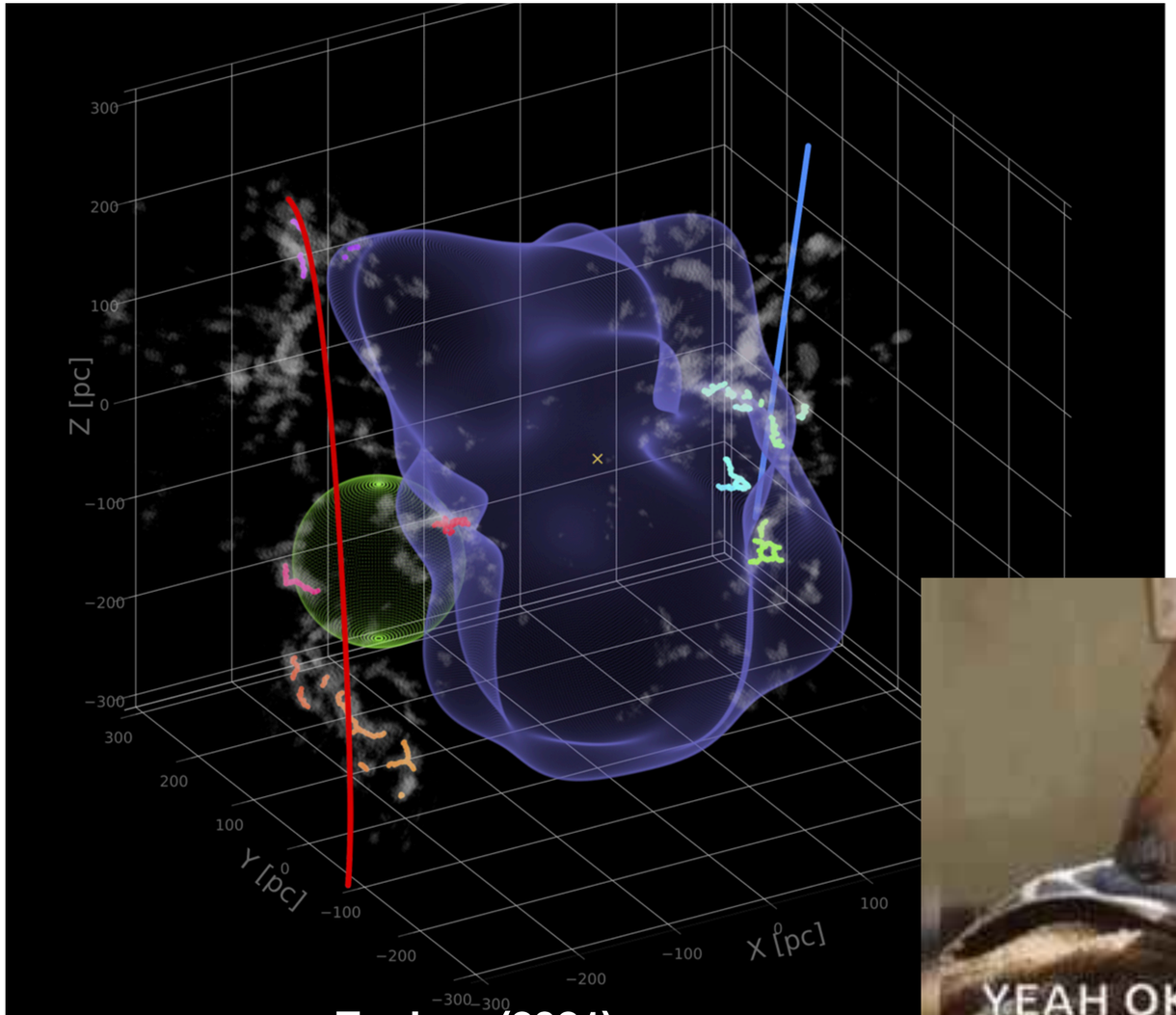
Marka+2012

Suzuki+1992





Is it raining onto YSOs?



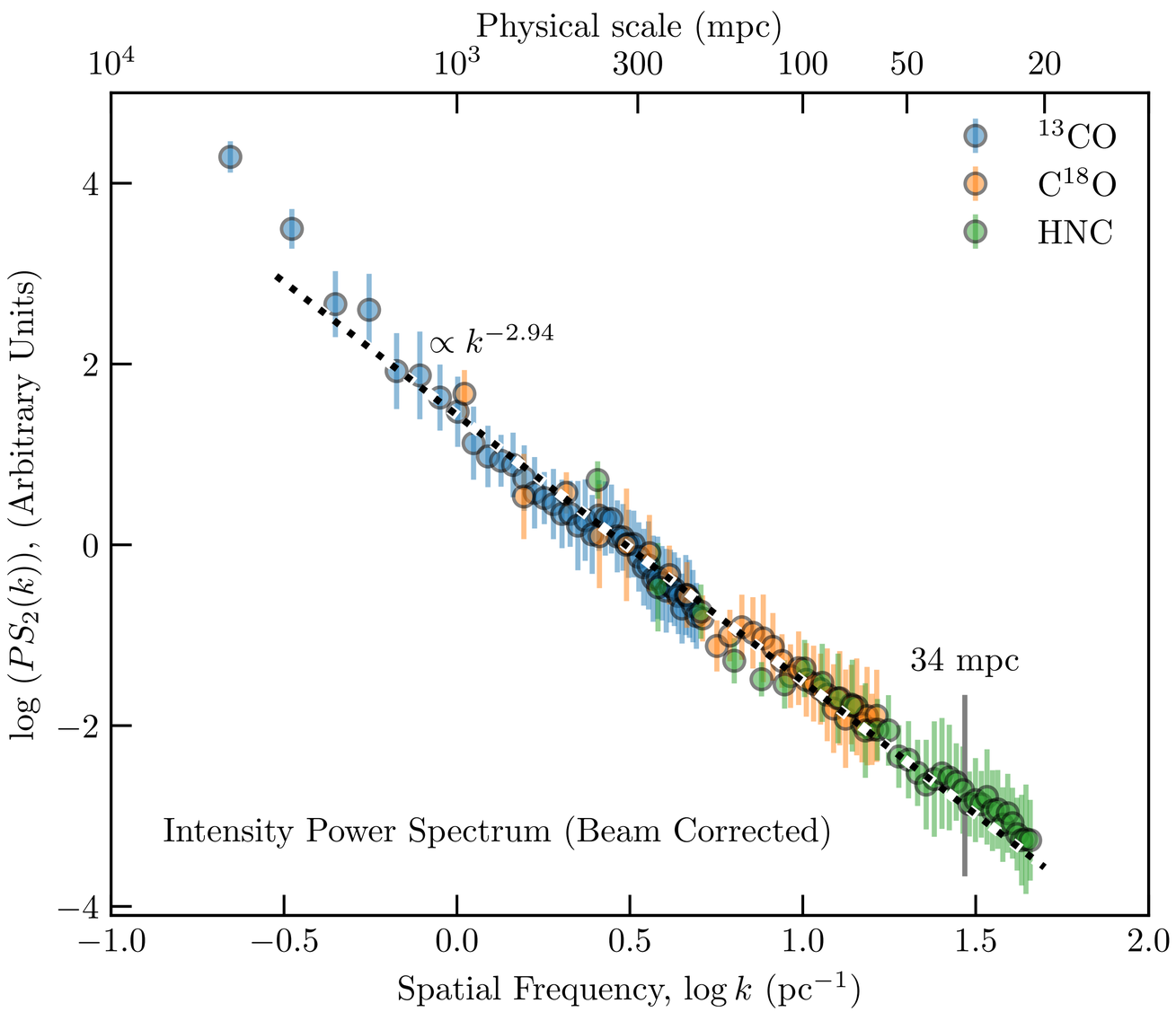
Zucker+(2021)

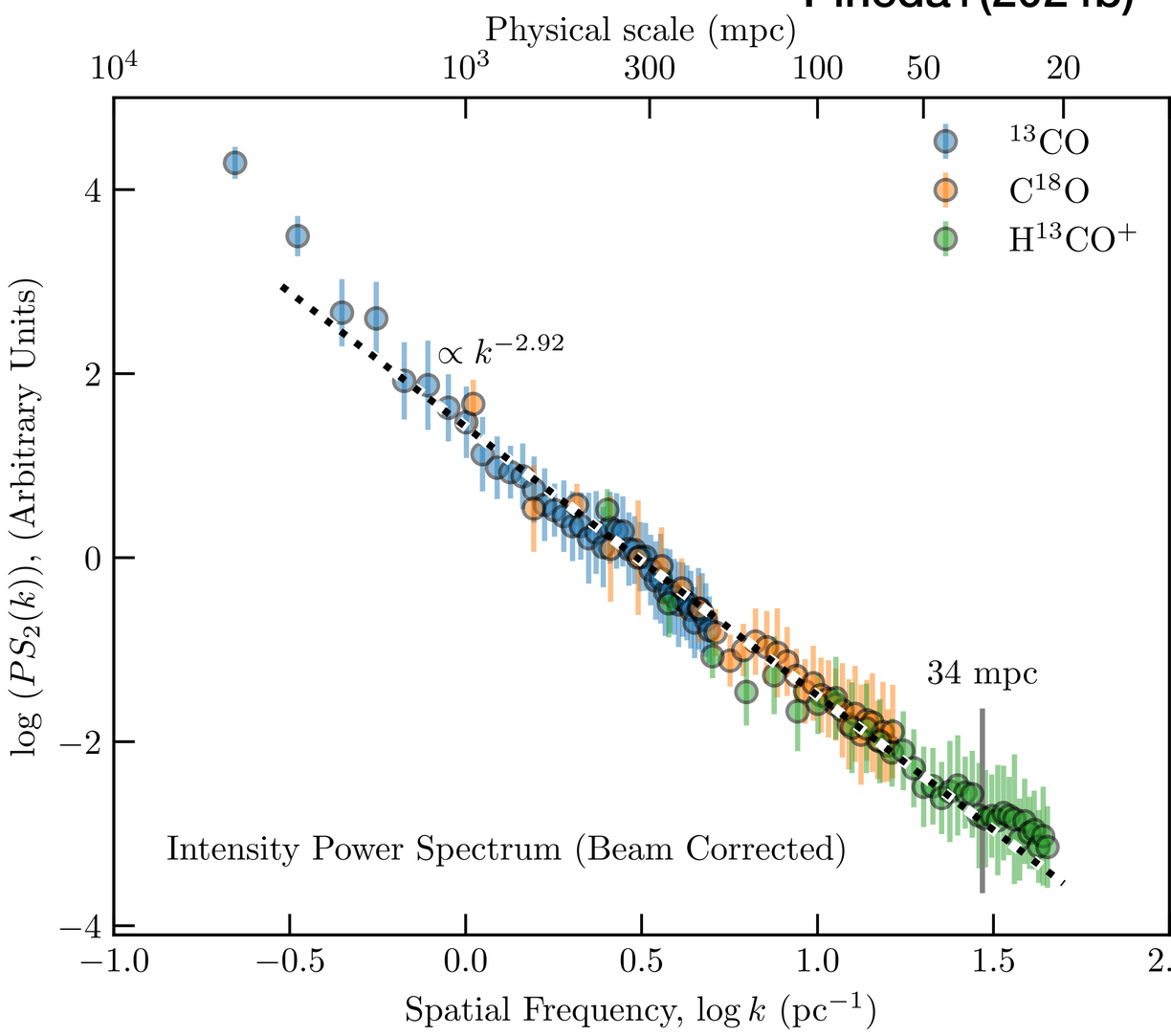
ChatGPT

Can the power-law spectrum be linked to cloud properties?

$$\lambda_{min} = \sqrt{\frac{\pi}{4\mu\, m_{\rm H}\, n({\rm H}_2)}}\,\frac{B_o}{n({\rm H}_2)\, X(e)\, \langle \sigma\, v \rangle}$$

Pineda+(2024b)





Open questions

Where do streamers come from?

Do all streamer have the same origin?

What molecules can we use to trace these objects?

What is the frequency of streamers?

Are we recovering all the mass?

Are streamers linked to material from outside the molecular cloud?

Is it possible to connect bubbles-cloud interaction with streamer origin?

What other properties should be studied to explore the cloud connection?

Can we derive correction factors from simulations?