# How does the atomic ISM affect molecular cloud formation...?

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...and how can we study it?

Two approaches using the THOR survey (Beuther et al. 2016, Wang et al. 2020):
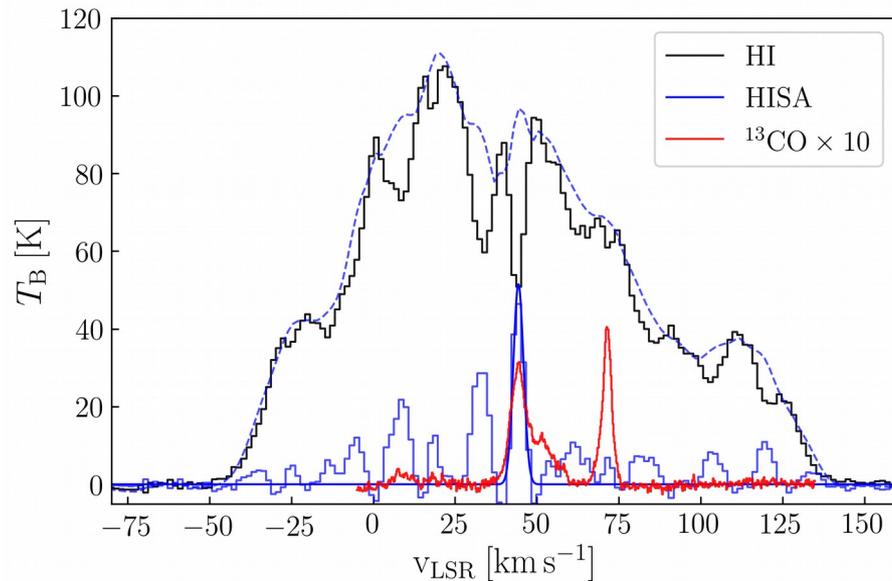

HI self-absorption (HISA)
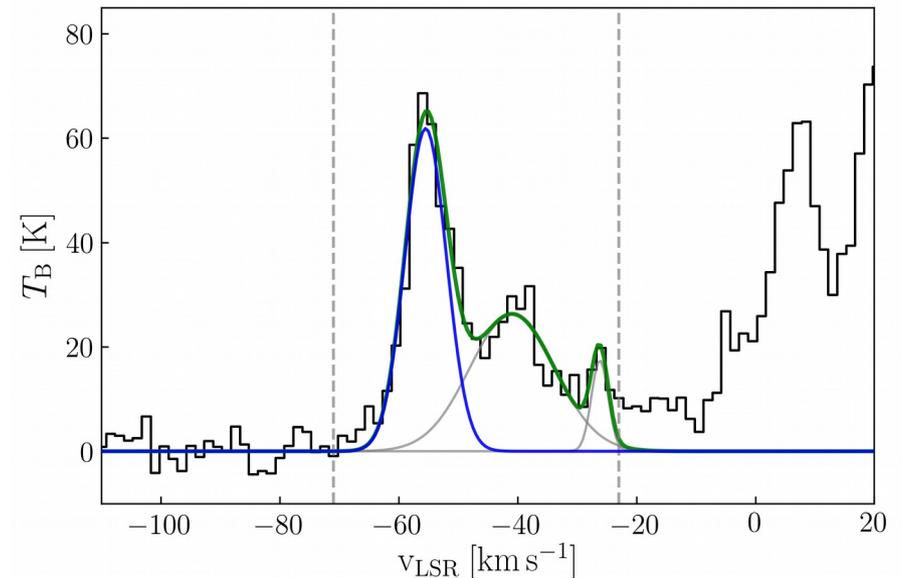
HI emission

HI self-absorption (HISA)

HI emission: Warm and cold neutral medium (WNM+CNM)
→ HISA probing the CNM, isolating it from warm emission

HISA extraction method: asymmetric least squares fitting (Eilers et al. 2005)
(or simple polynomial fits; see e.g. Syed et al. 2020)
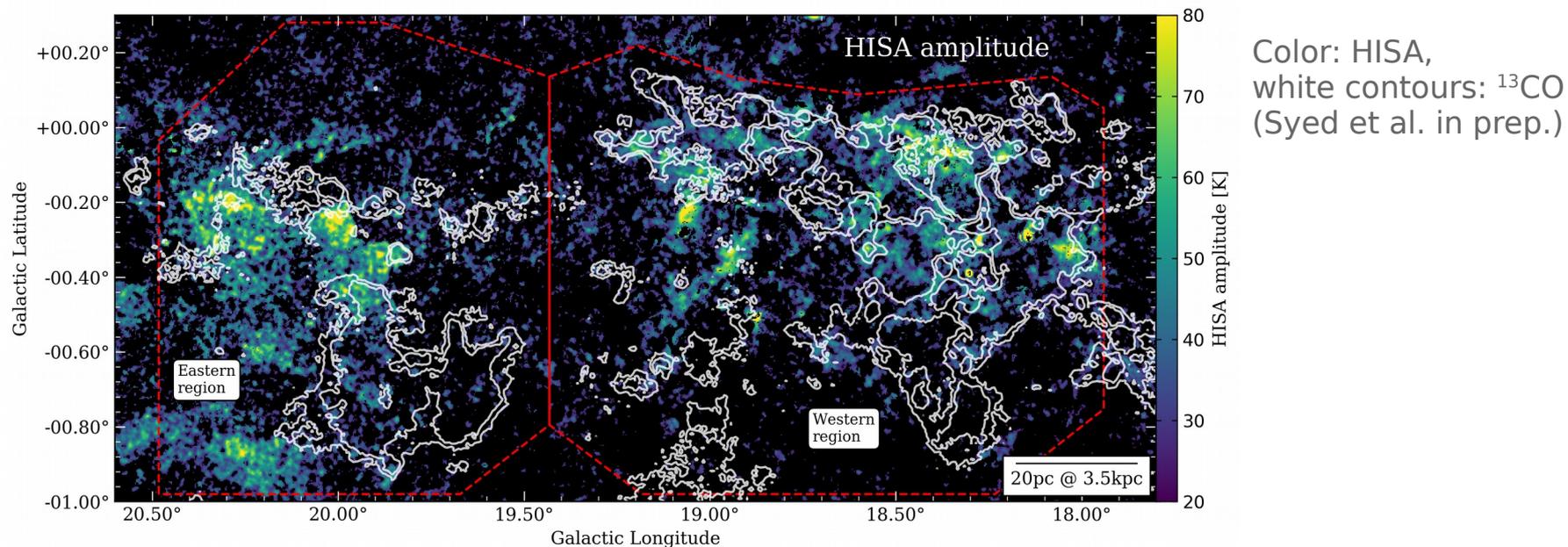
What is the relationship between cold HI and molecular gas?

What are good metrics?

Histogram of Oriented Gradients tool (HOG; Soler et al. 2019)
→ compare intensity gradients of two tracers; good alignment → High V
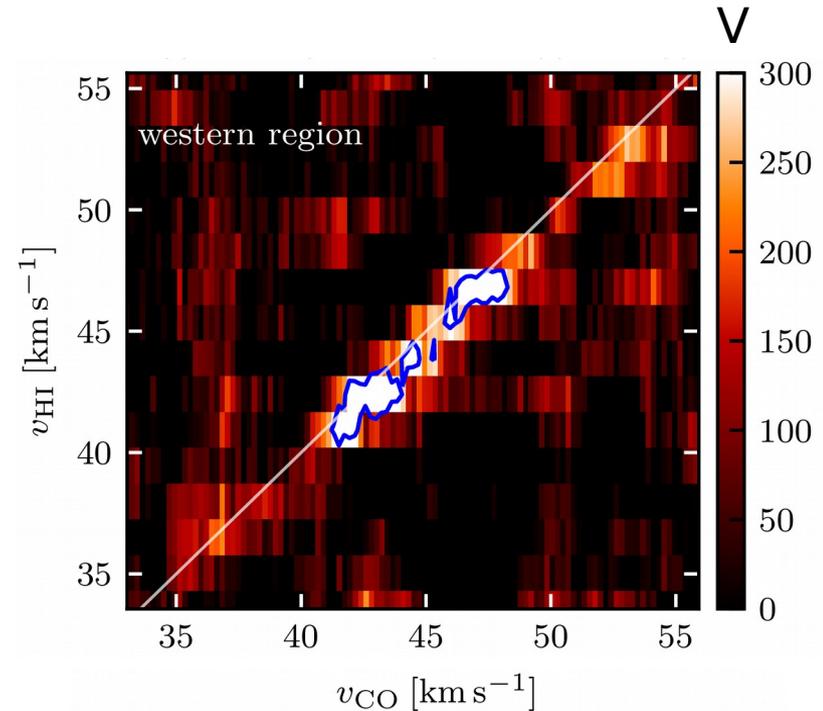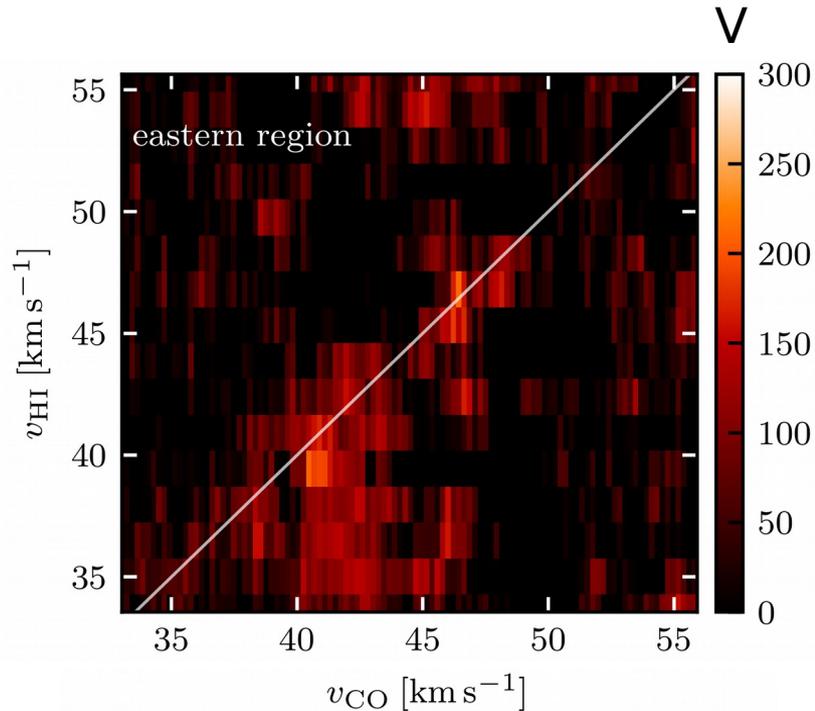

HOG correlation (Syed et al. 2020)

HI emission

The "Maggie" filament (Soler et al. 2020, Syed et al. submitted)
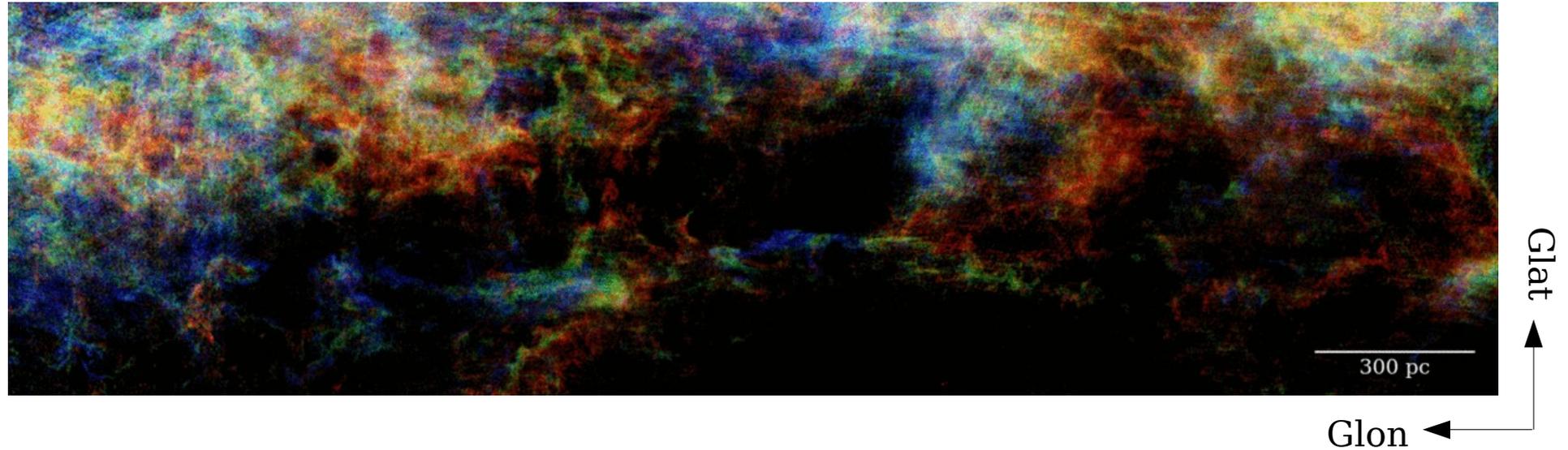
- Global structure of HI: network of filaments preferentially parallel to the Galactic plane
- Molecular gas structure: not the same! (Soler et al. in press)
- Maggie's distance: ~17 kpc; below midplane (by ~500 pc)
- Purely atomic; little to no molecular gas

What are good metrics?

Column density PDFs?

Syed et al. 2020
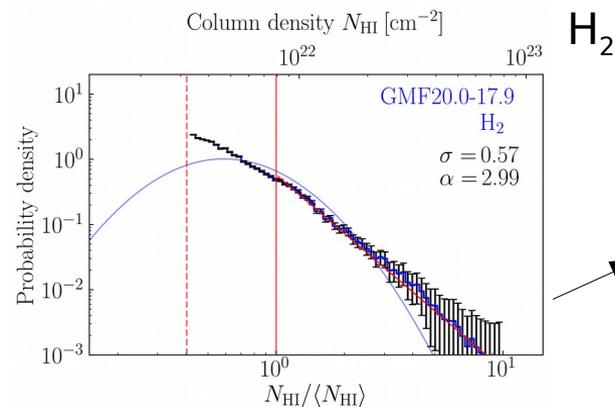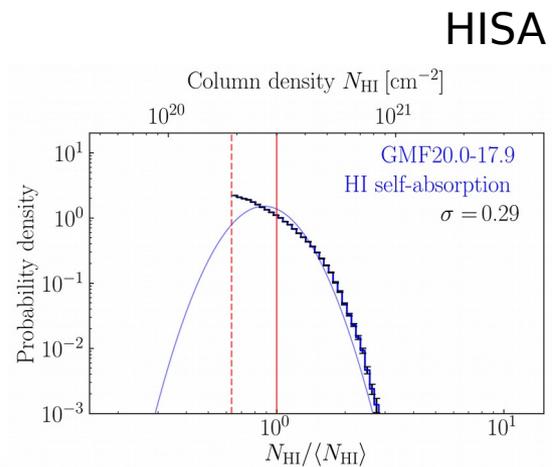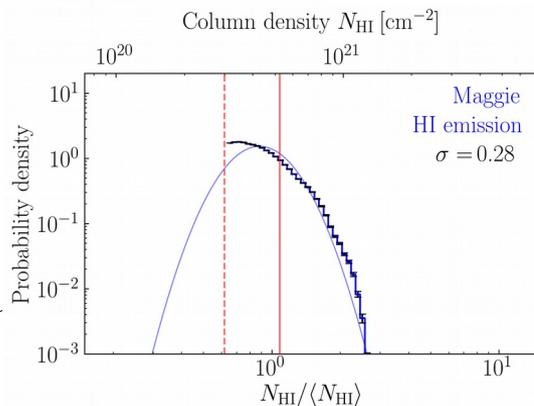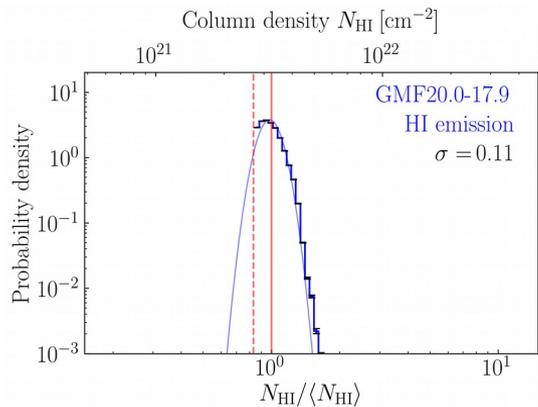
HI emission

HI emission Syed et al. submitted

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...and how can we study it?

What dominates atomic/molecular filament formation?

Is the Maggie filament actually a piece of sheet?

What are good metrics?

- Histogram of Oriented Gradients,

- (N-)PDFs (slopes, widths,...),

- Power spectra/structure functions (slopes),

- ...?
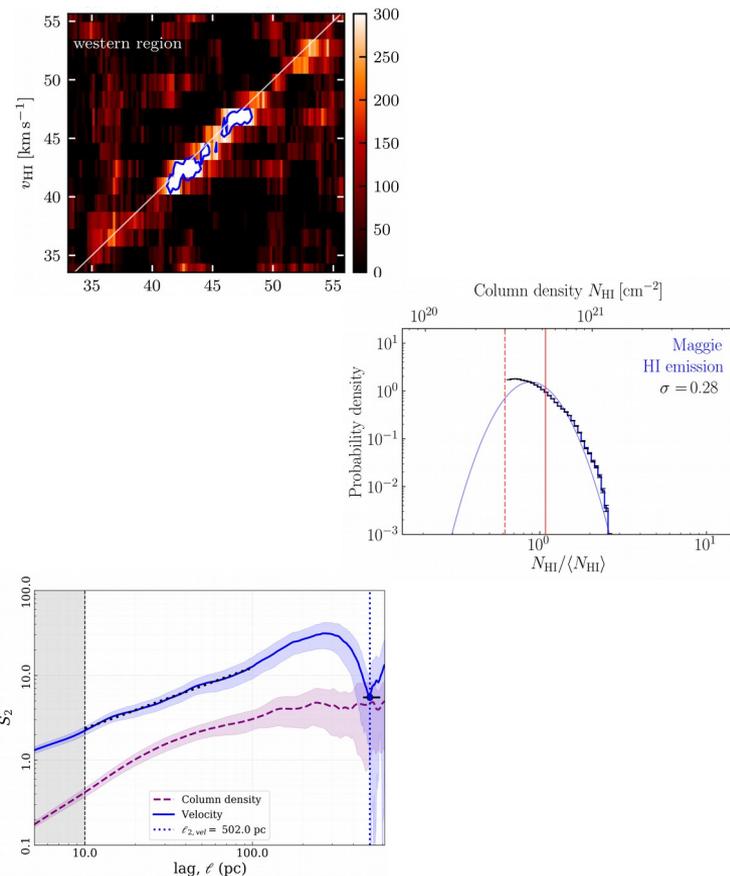
What are the parameters that we can/should derive in order to address this?