



$\text{N}_2\text{H}^+(1-0)$ Structures of Filaments in Serpens Main and Serpens South

Katherine I. Lee (UMD)

Collaborators: Lee Mundy (UMD), Manuel Fernandez (UIUC), Shaye Storm (UMD), Leslie Looney (UIUC), Dominique Segura-Cox (UIUC), Peter Teuben (UMD), Erik Rosolowsky (Alberta), Hector Arce (Yale), Yancy Shirley (Arizona), Adele Plunkett (Yale), John Tobin (NRAO), Andrea Isella (Caltech)

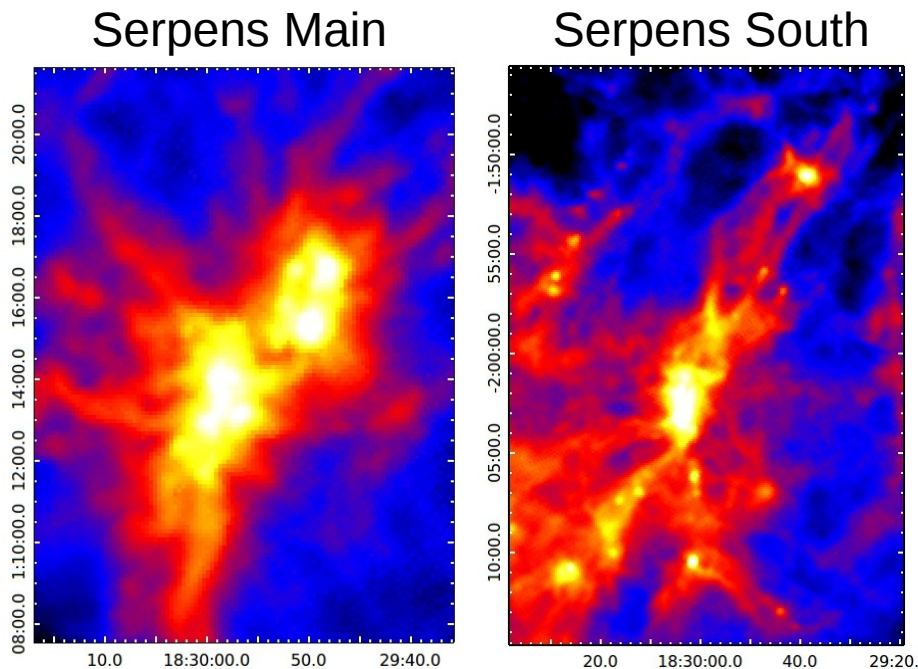
The CLASSy Team

Scientific Goal

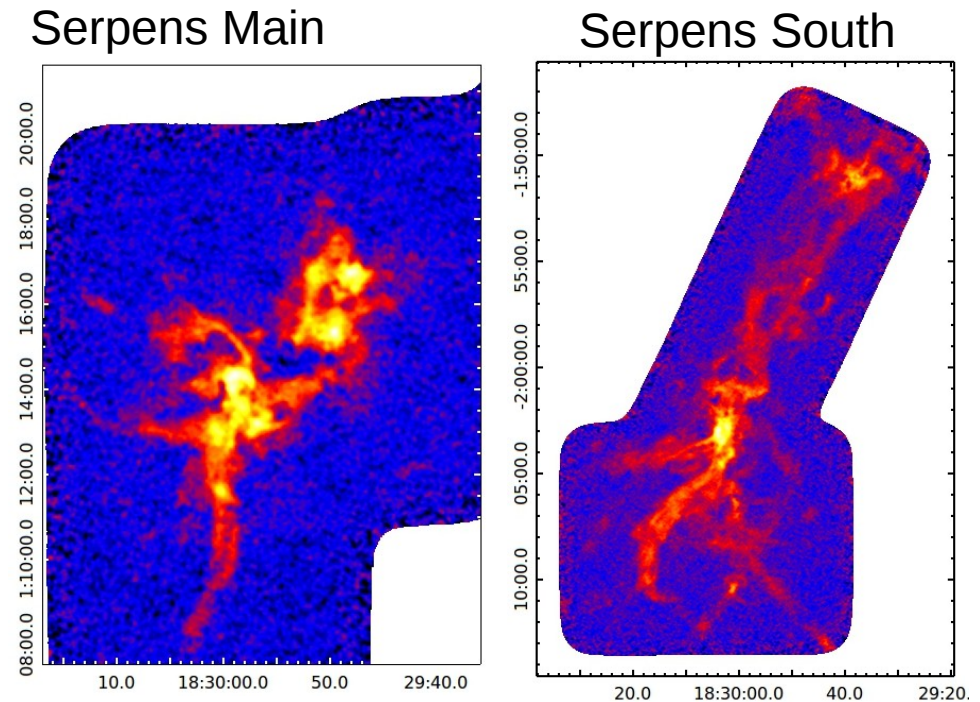
Understanding the role and the formation process of the filaments revealed by $\text{N}_2\text{H}^+(1-0)$

Data

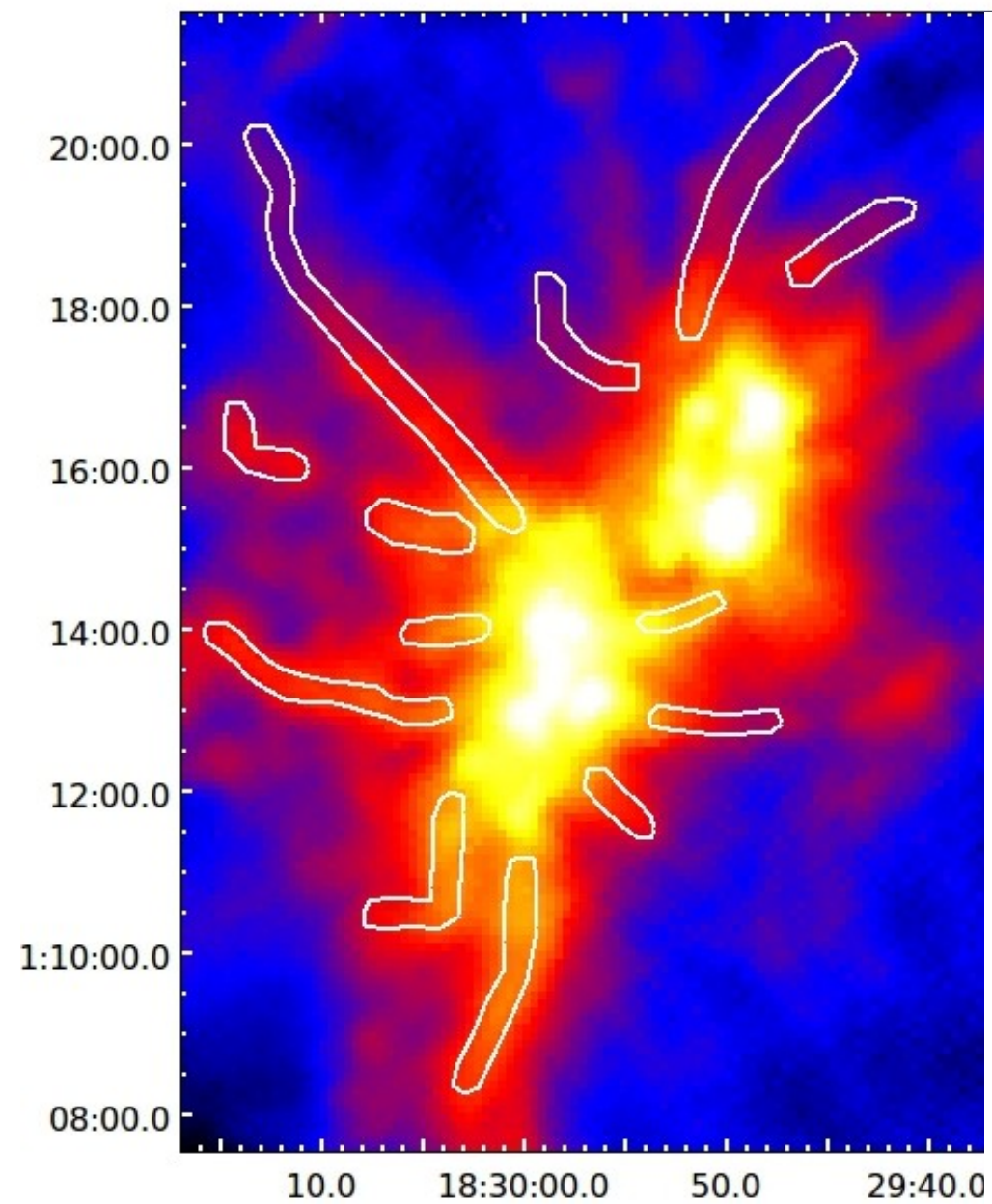
Herschel 250 μm :
18" resolution



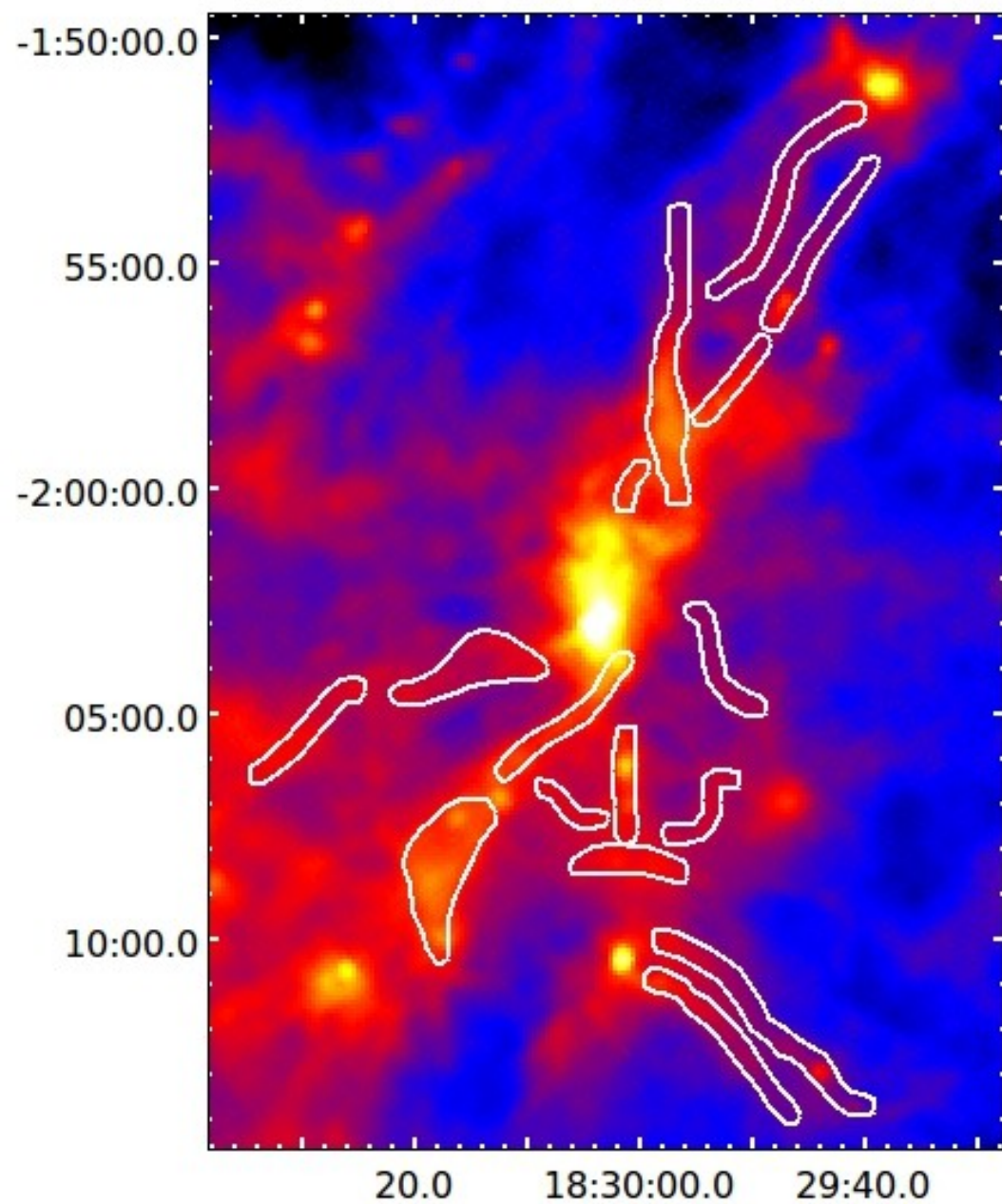
$\text{N}_2\text{H}^+(1-0)$ from CARMA Large Area Star-formation Survey (CLASSy; 7" resolution)



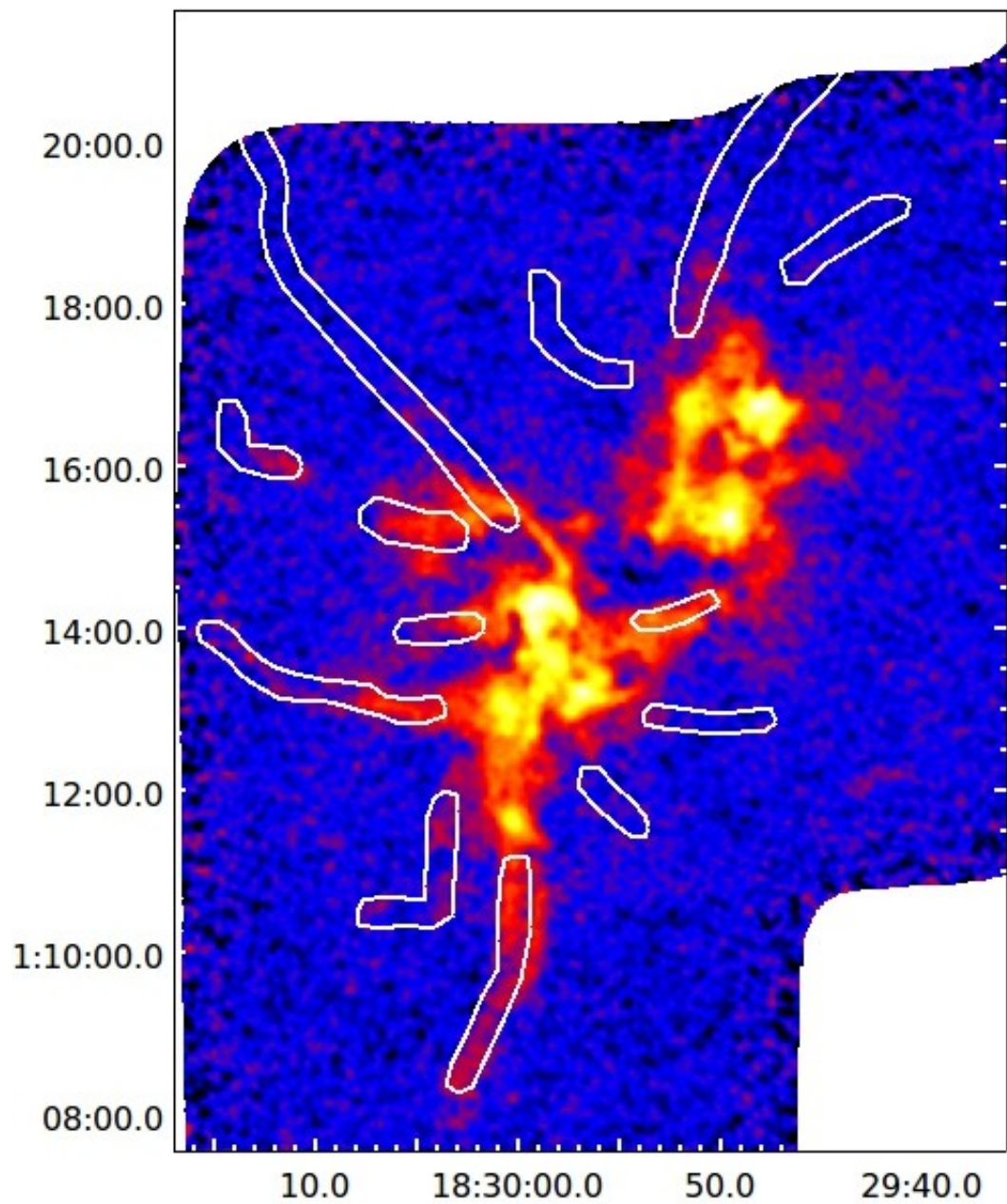
Serpens Main (Herschel 250 μm)



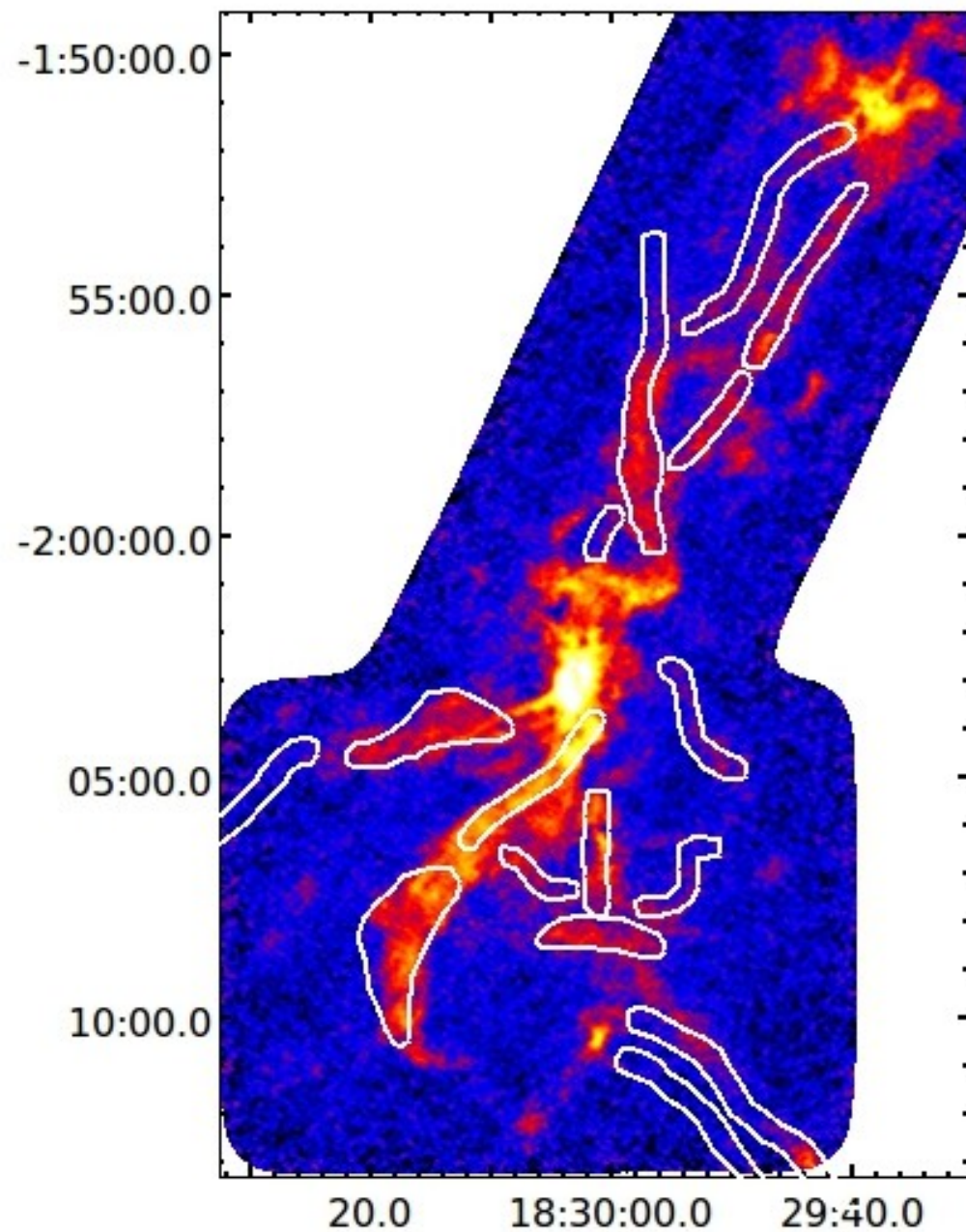
Serpens South (Herschel 250 μm)



Serpens Main (N_2H^+)

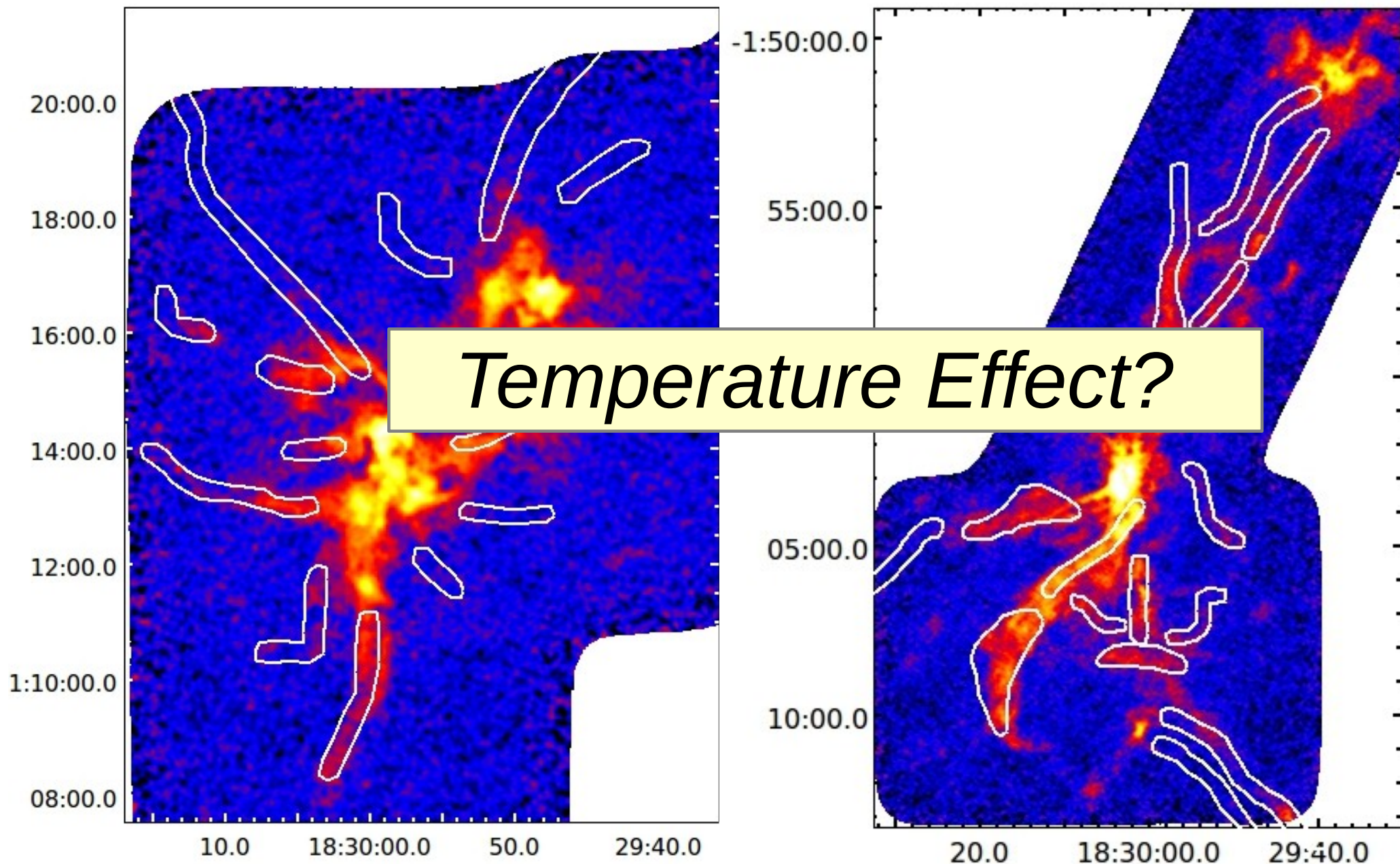


Serpens South (N_2H^+)



Serpens Main (N_2H^+)

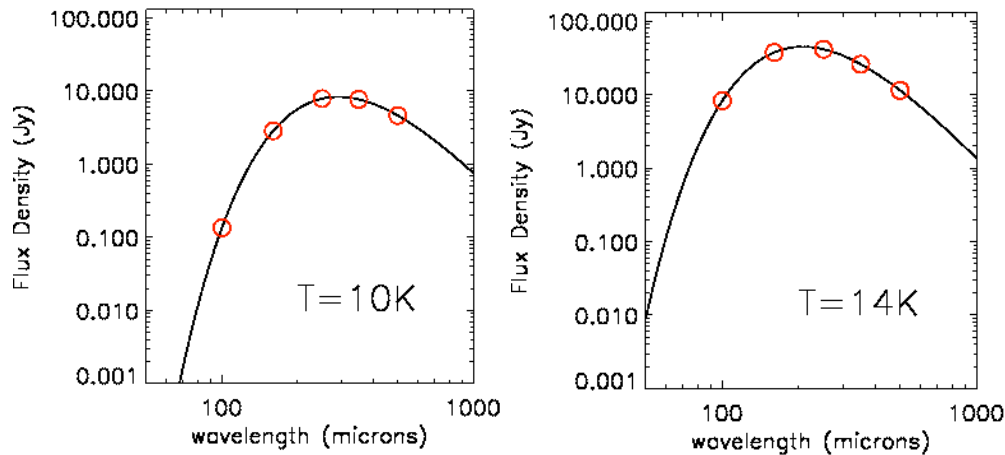
Serpens South (N_2H^+)



Derivation of Temperature Indicator

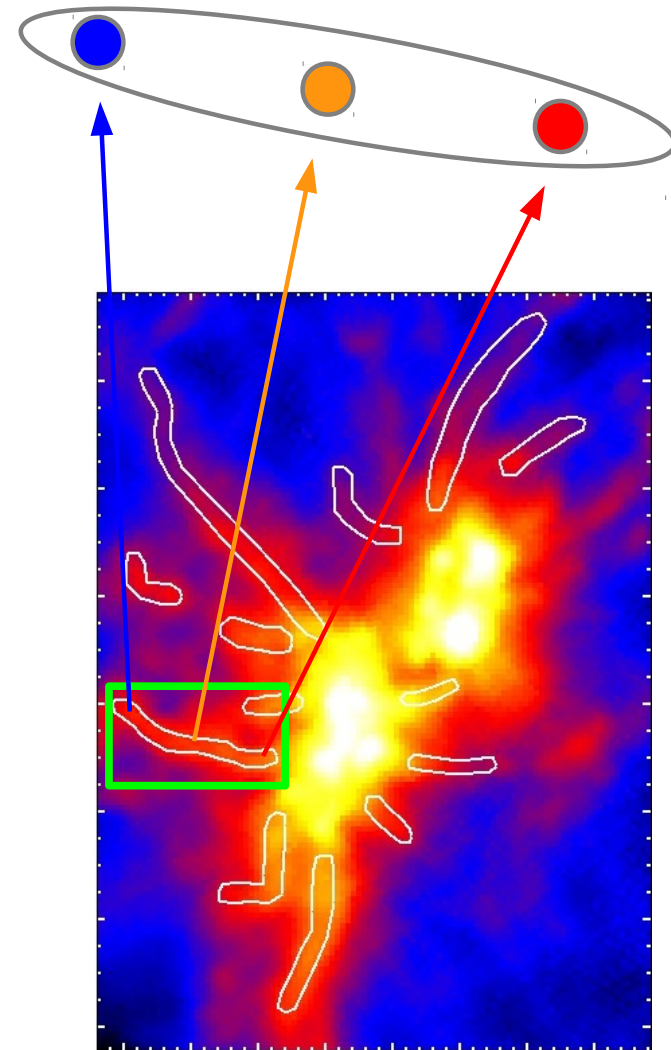
Grey Body SED

Red circles: 100, 160, 250, 350, 500 μm



- Flux is a function of T and N
- Temperature vs. slope
- All filaments background subtracted, convolved and regrided to 350 μm .
- Pixel-by-pixel comparison
- Single temperature poorly fits

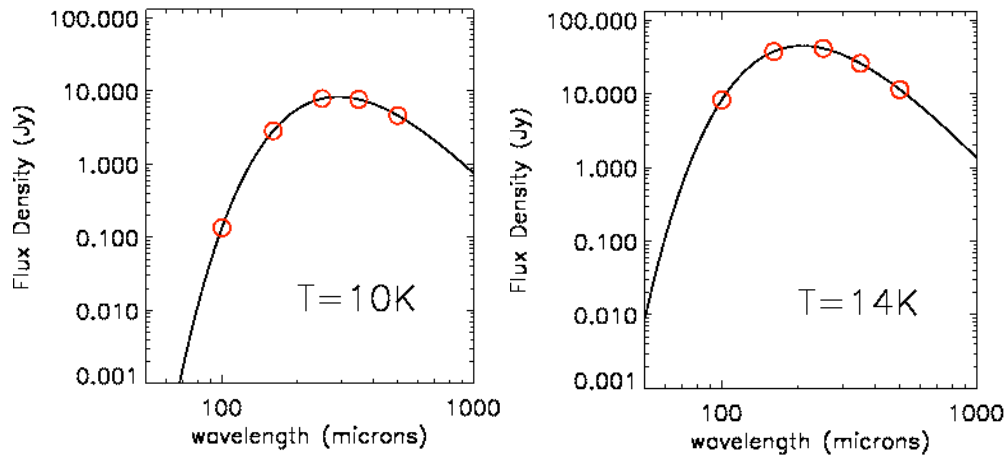
One filament example



Derivation of Temperature Indicator

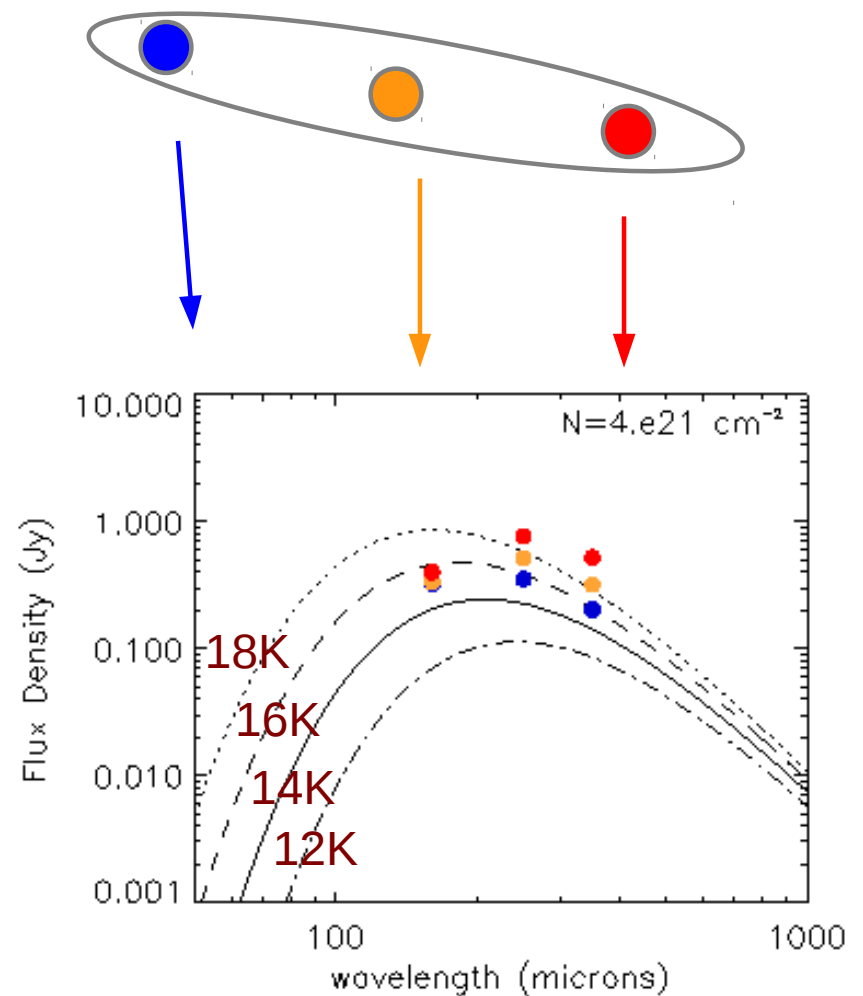
Grey Body SED

Red circles: 100, 160, 250, 350, 500 μm

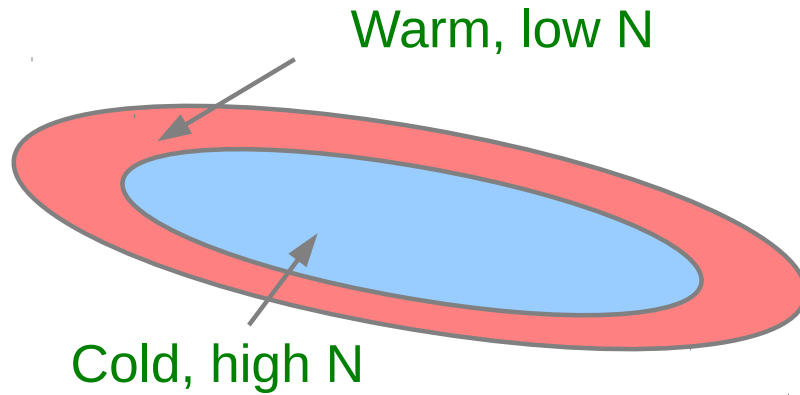


- Flux is a function of T and N
- Temperature vs. slope
- All filaments background subtracted, convolved and regridded to 350 μm .
- Pixel-by-pixel comparison
- Single temperature poorly fits

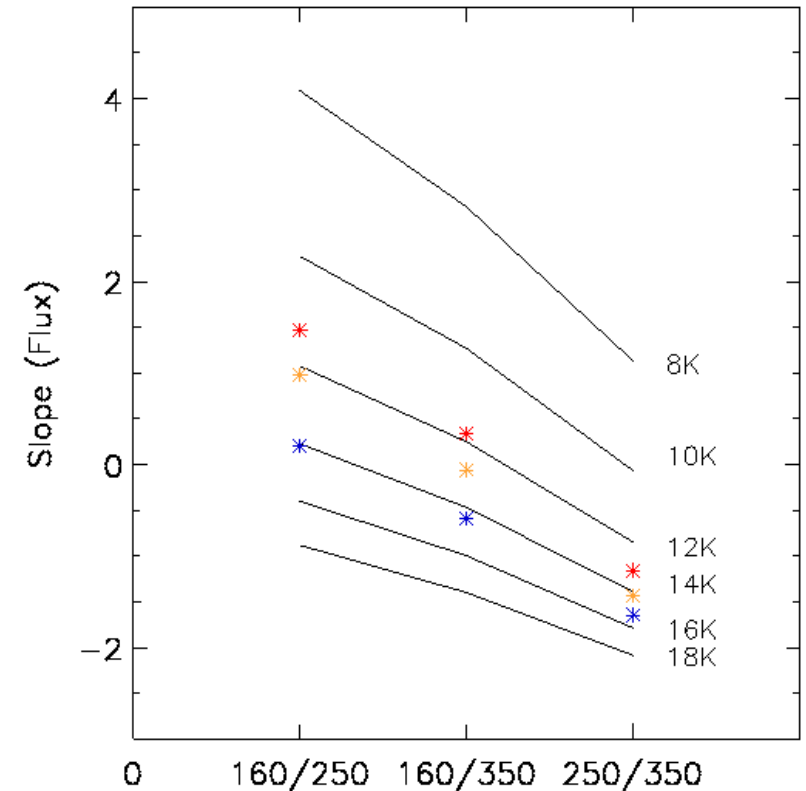
One filament example



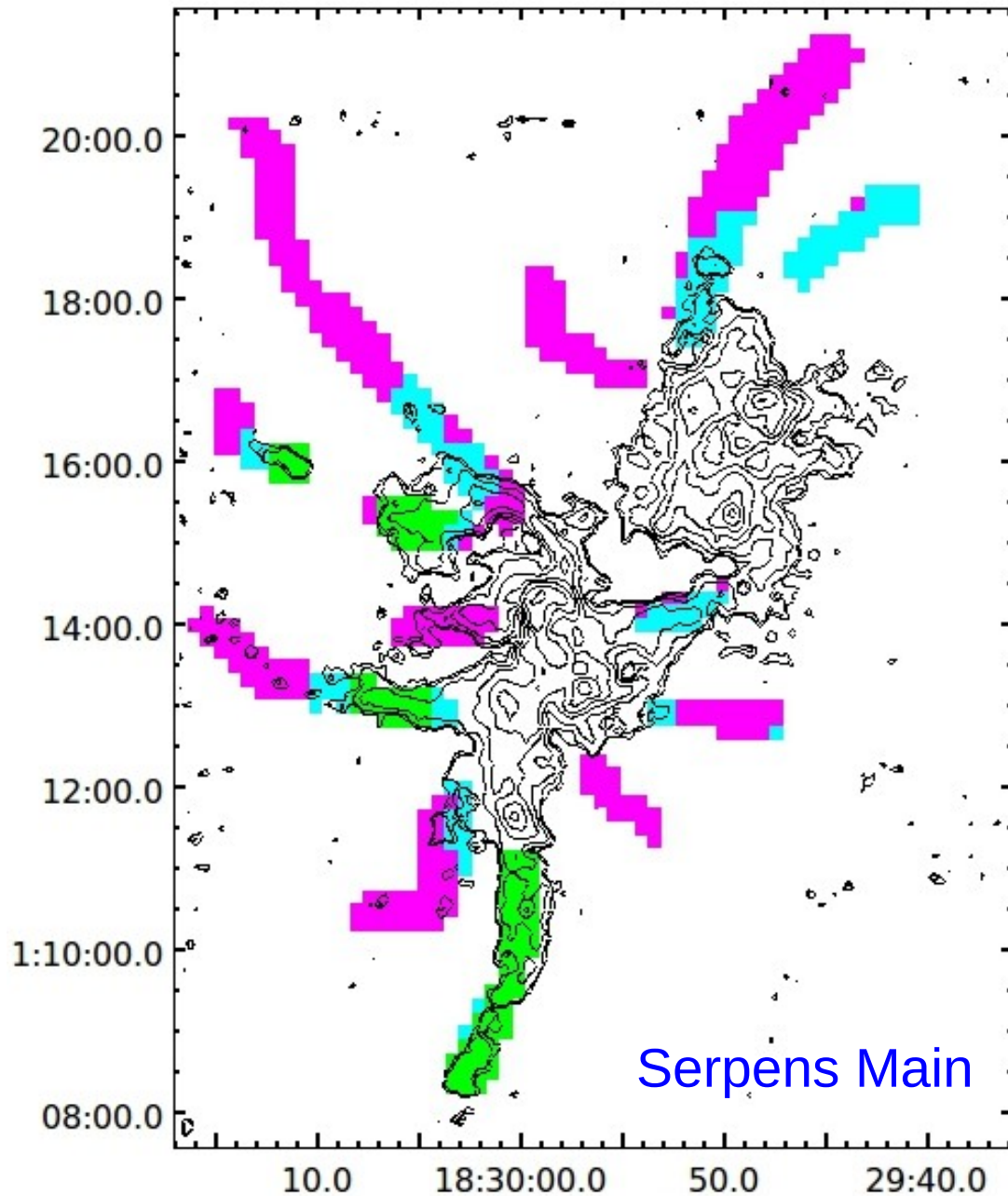
Derivation of Temperature Indicator



- Two Temperature Model explains data
- Dividing filaments to warm and cold
- 160/350: temperature indicator (close to equal weight of 160/250 and 250/350)

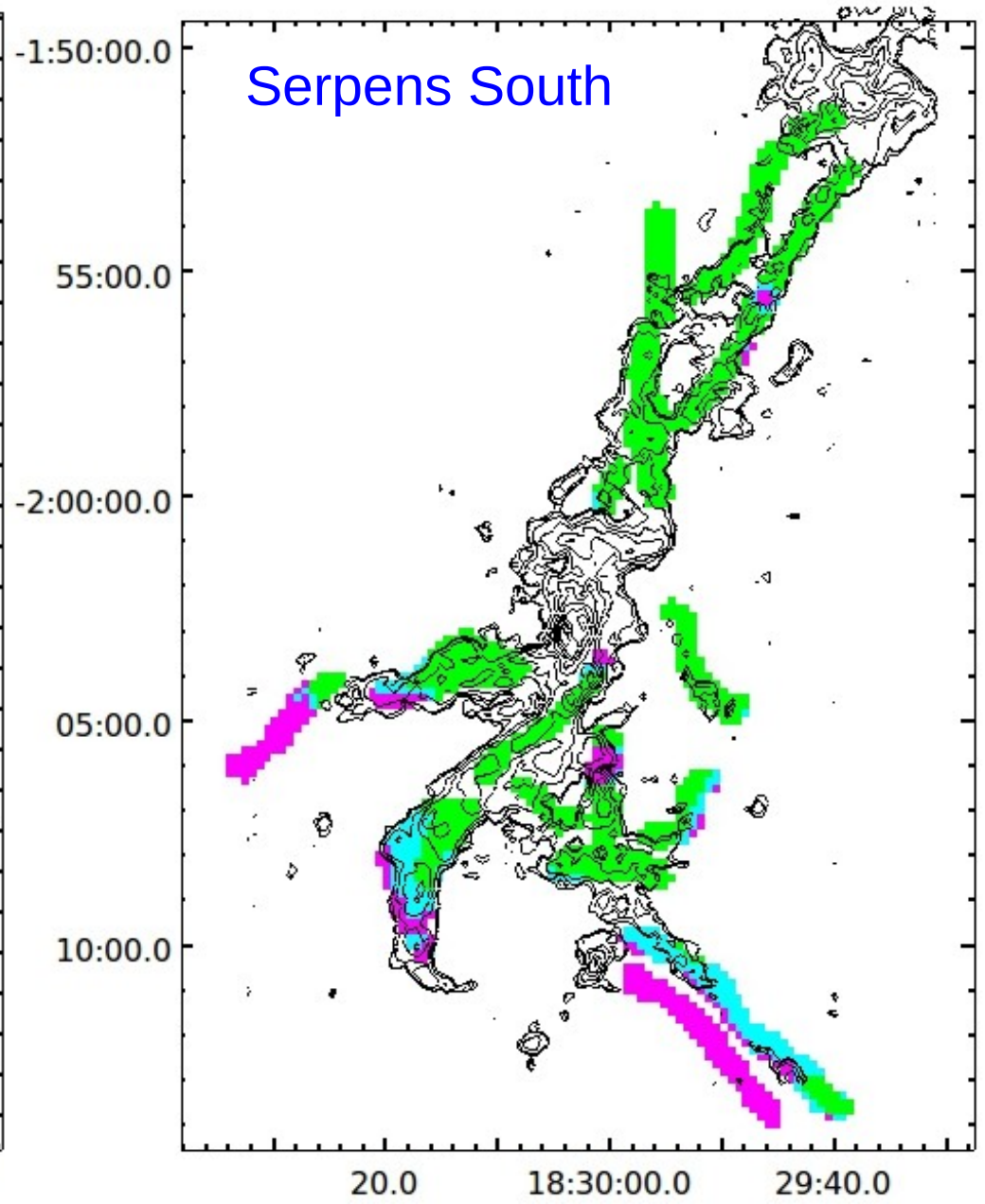
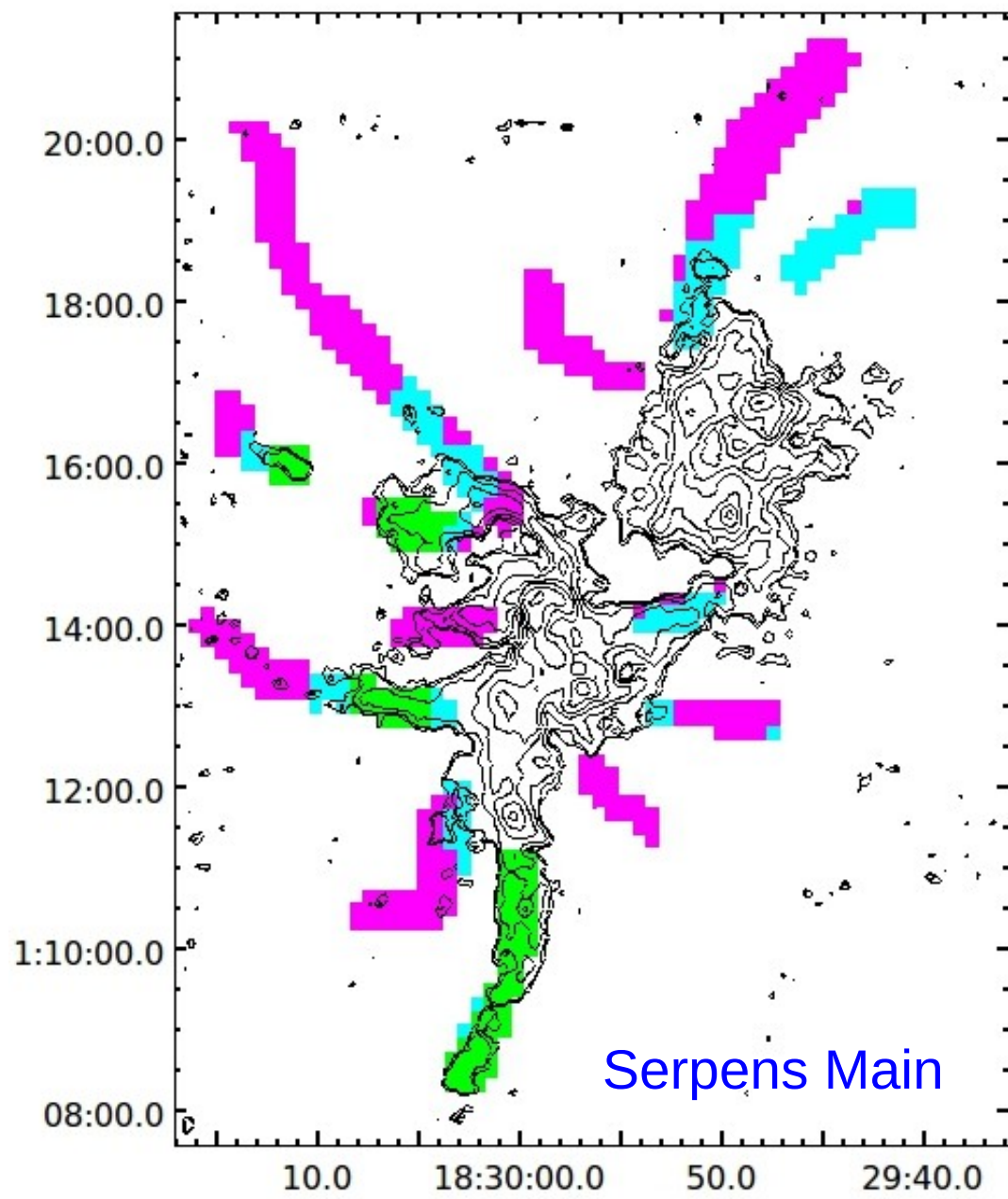


Temperature vs. $N_2H^+(1-0)$

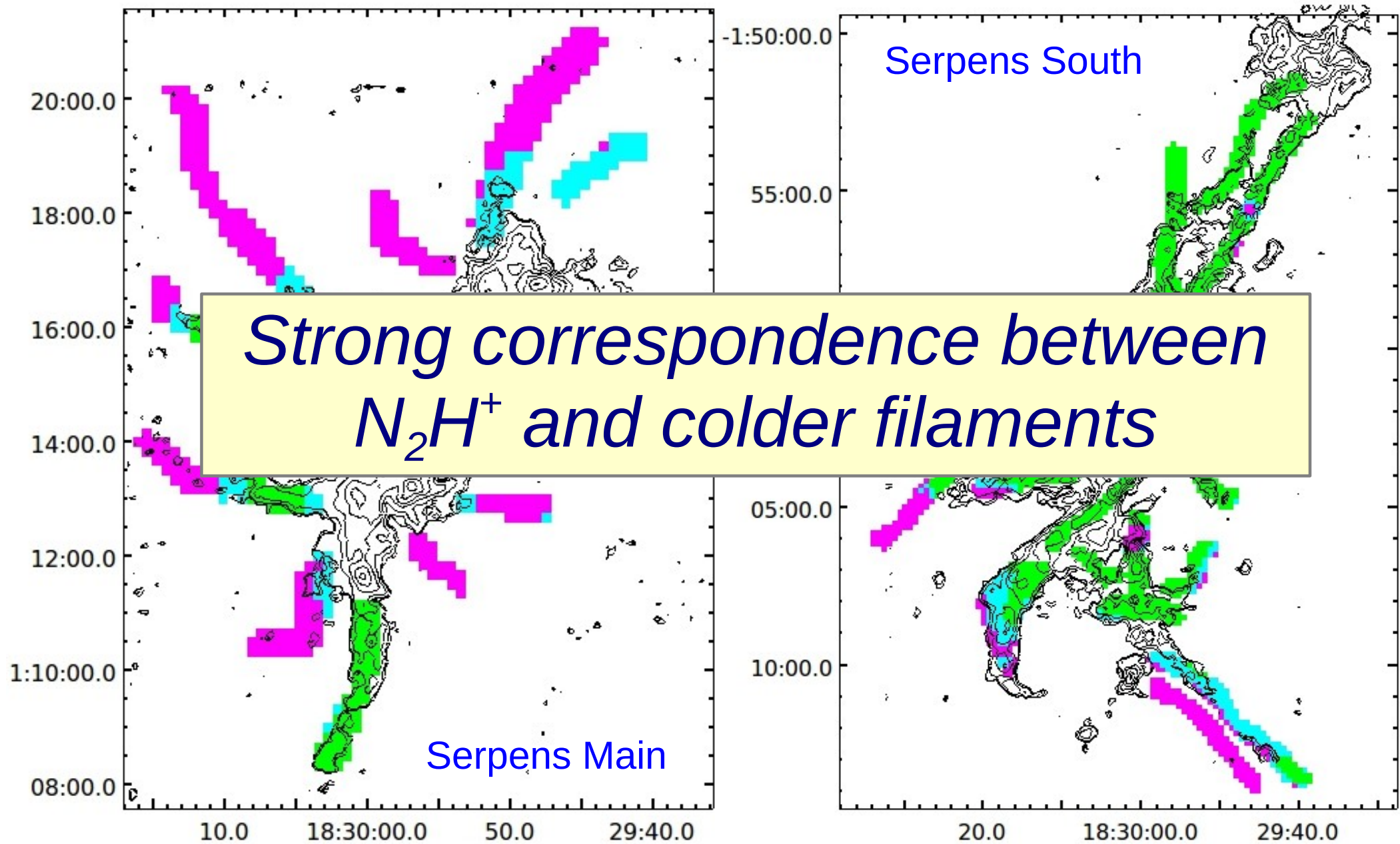


- T range: 10 K to 18 K
- **Green (colder):** $T < 12.0$ K
- **Cyan (transitional):** $12.0 \text{ K} < T < 13.0 \text{ K}$
- **Magenta (warmer):** $T > 13.0$ K
- Black contours: $N_2H^+(1-0)$

Temperature vs. $N_2H^+(1-0)$



Temperature vs. $N_2H^+(1-0)$

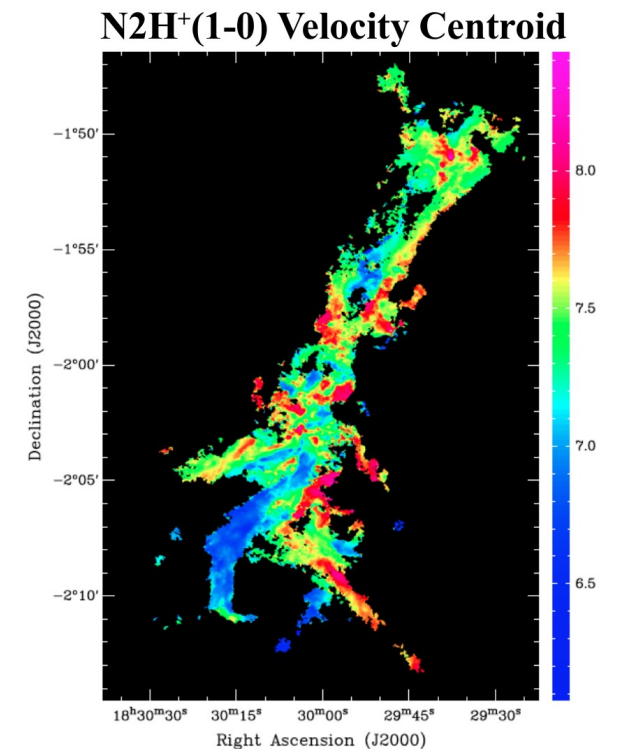


Summary

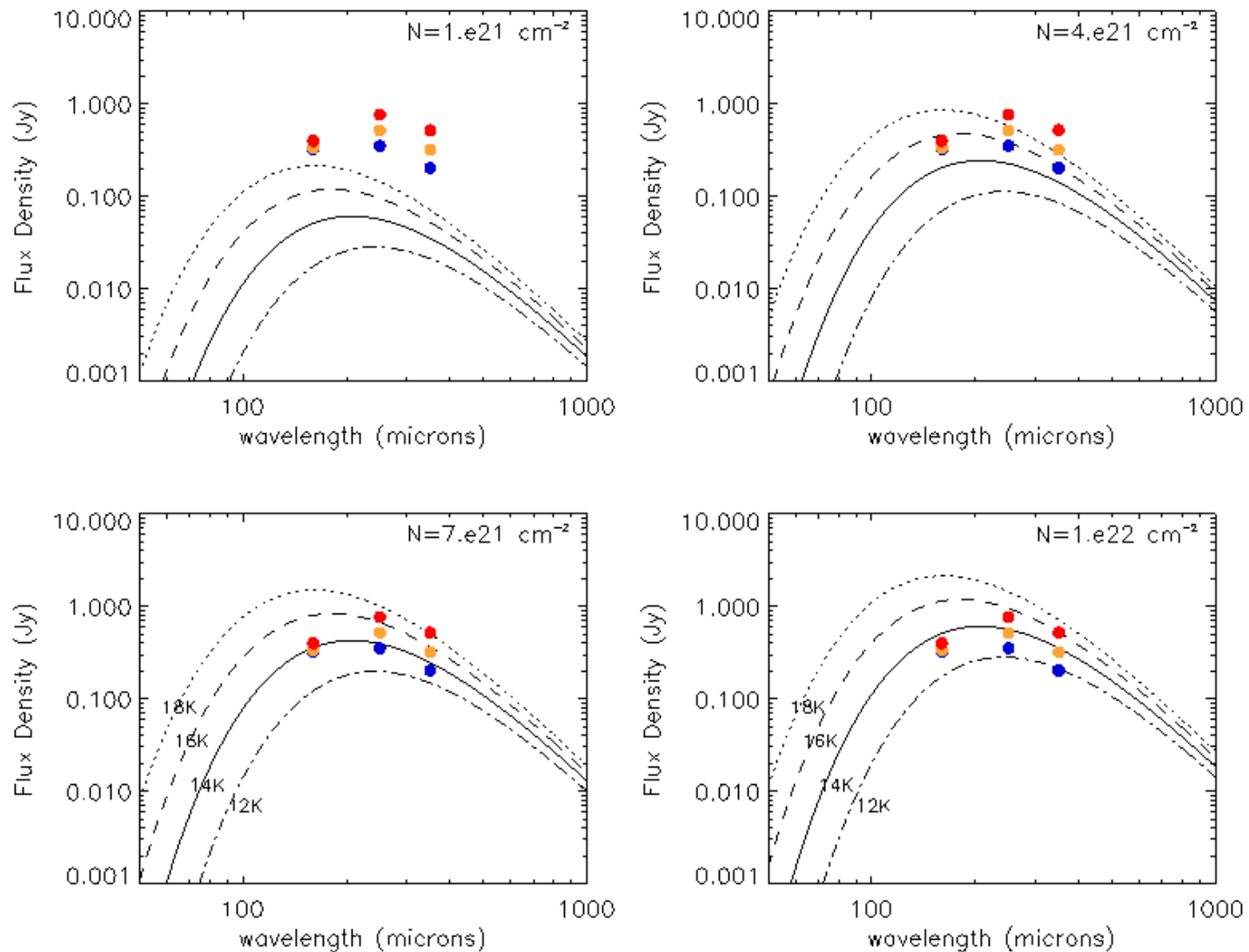
- Two-temperature model better explains the data
- $\text{N}_2\text{H}^+(1-0)$ traces colder filaments ($T < 12.5\text{K}$) in Serpens Main and South

Next Step

- Temperature vs. kinematic structures revealed by N_2H^+
- Stop by the poster (Looney et al.)
Today (244. Star Formation)!



Derivation of Temperature Indicator



Derivation of Temperature Indicator

