

# A taxonomy of gas substructures in the MonR2 giant molecular cloud

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# Filament Significance



Are they “Ubiquitous” in star-forming molecular clouds?

Are they “Universal” in their structure?

What is their role in Star Formation?

# A Role for the MonR2 SPIRE Survey

High spatial dynamic range: isolate 0.1-10pc structures in projection

Large cloud: 40x40pc and  $3 \times 10^4$  Msun

Substantial SF: ~1000 YSOs w/ IR-excess

Unbiased survey of a wide range of star-forming environments.

Downside: 830 pc away; SPIRE500  $\rightarrow$  0.1pc

# Structure Extraction Process

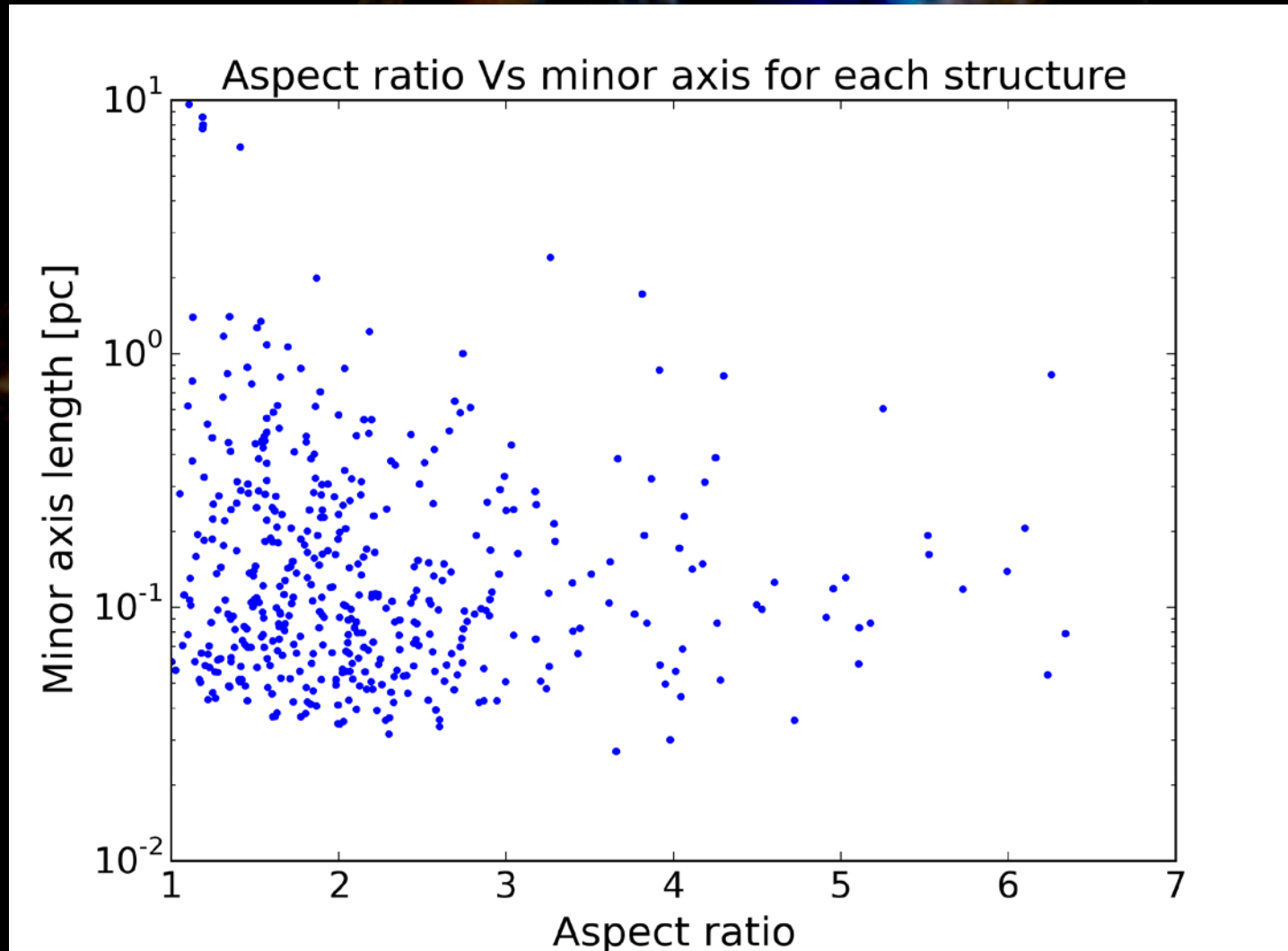
Greybody fits to SPIRE bands, yielding  $T$ ,  $N(\text{H}_2)$

“AstroDendro” nested structure extraction

Near-degenerate substructure “cleanup” process required.

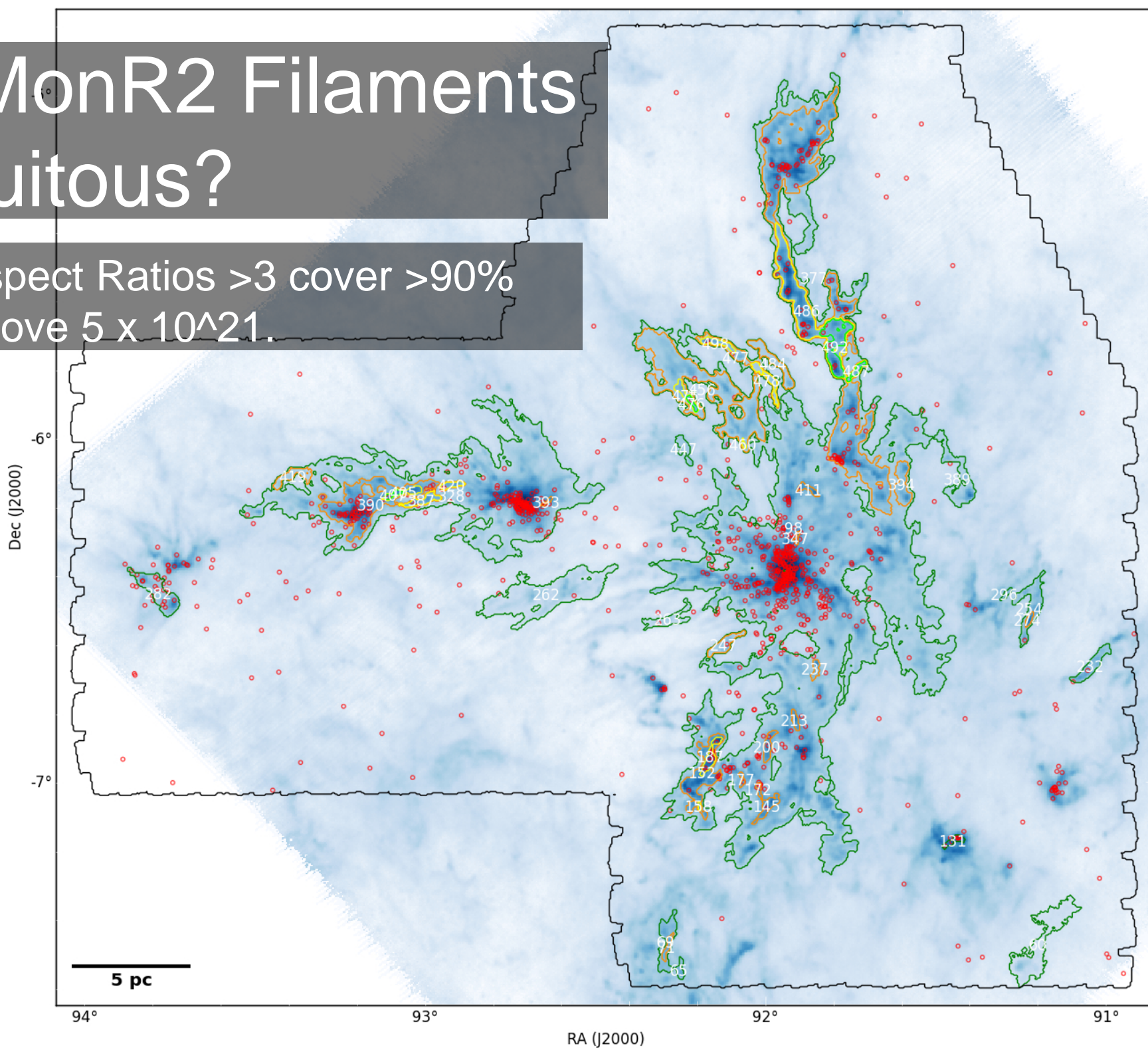
# Are MonR2 Filaments Ubiquitous?

No? Aspect Ratios  $>2$  for less than half (over ALL sizes!)



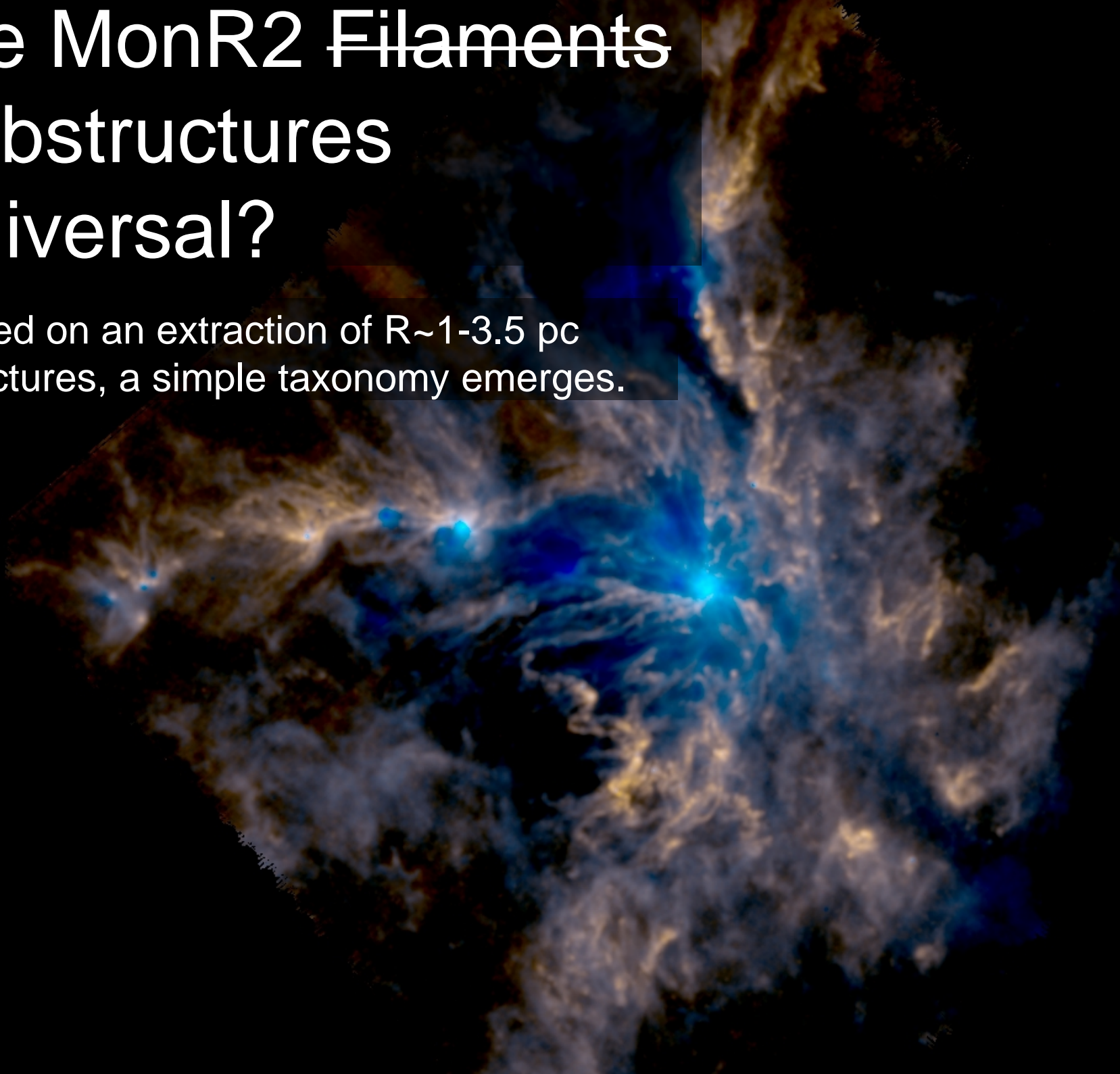
# Are MonR2 Filaments Ubiquitous?

Yes? Aspect Ratios  $>3$  cover  $>90\%$  cloud above  $5 \times 10^{21}$ .



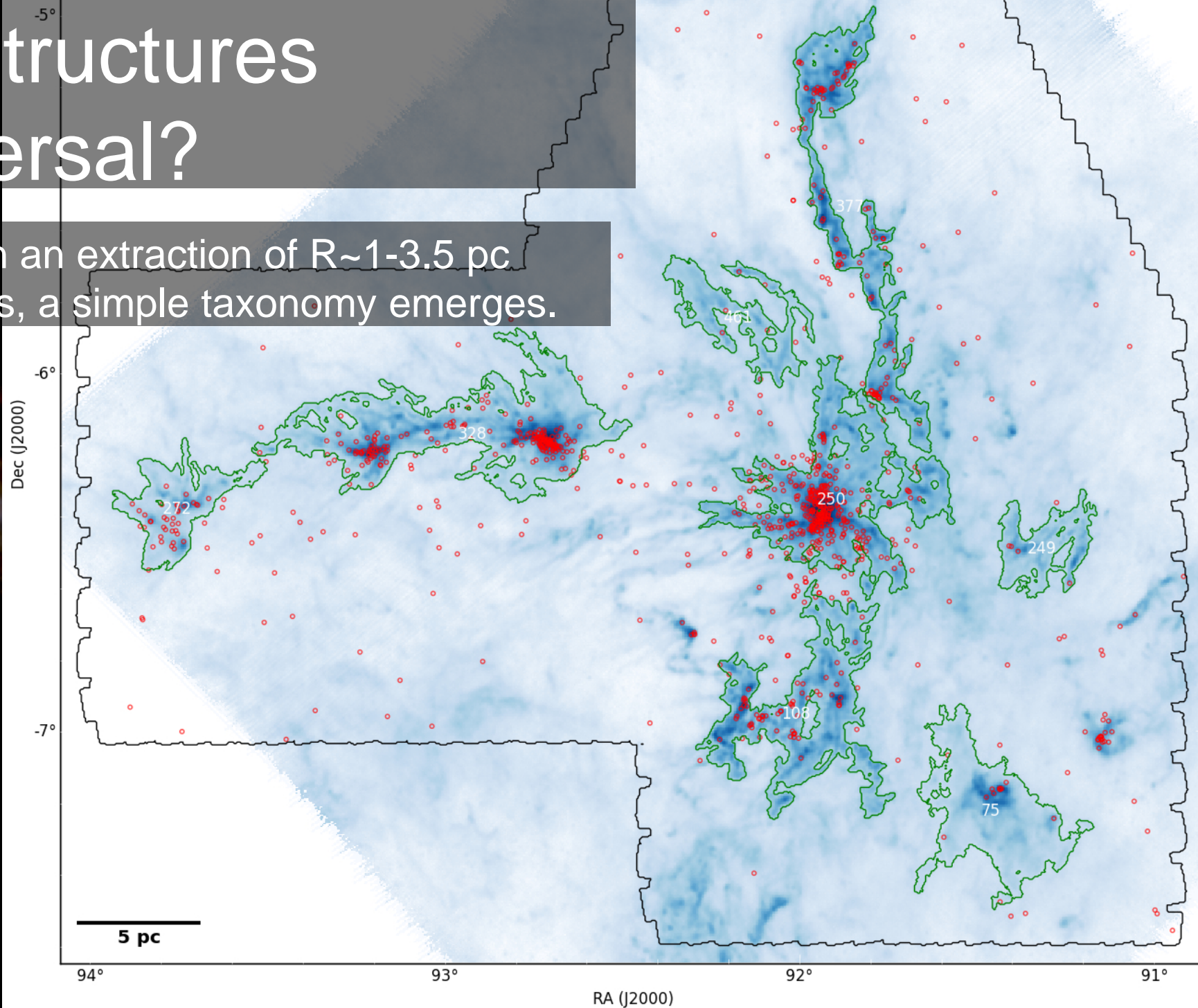
# Are MonR2 Filaments Substructures Universal?

Based on an extraction of  $R \sim 1-3.5$  pc  
structures, a simple taxonomy emerges.



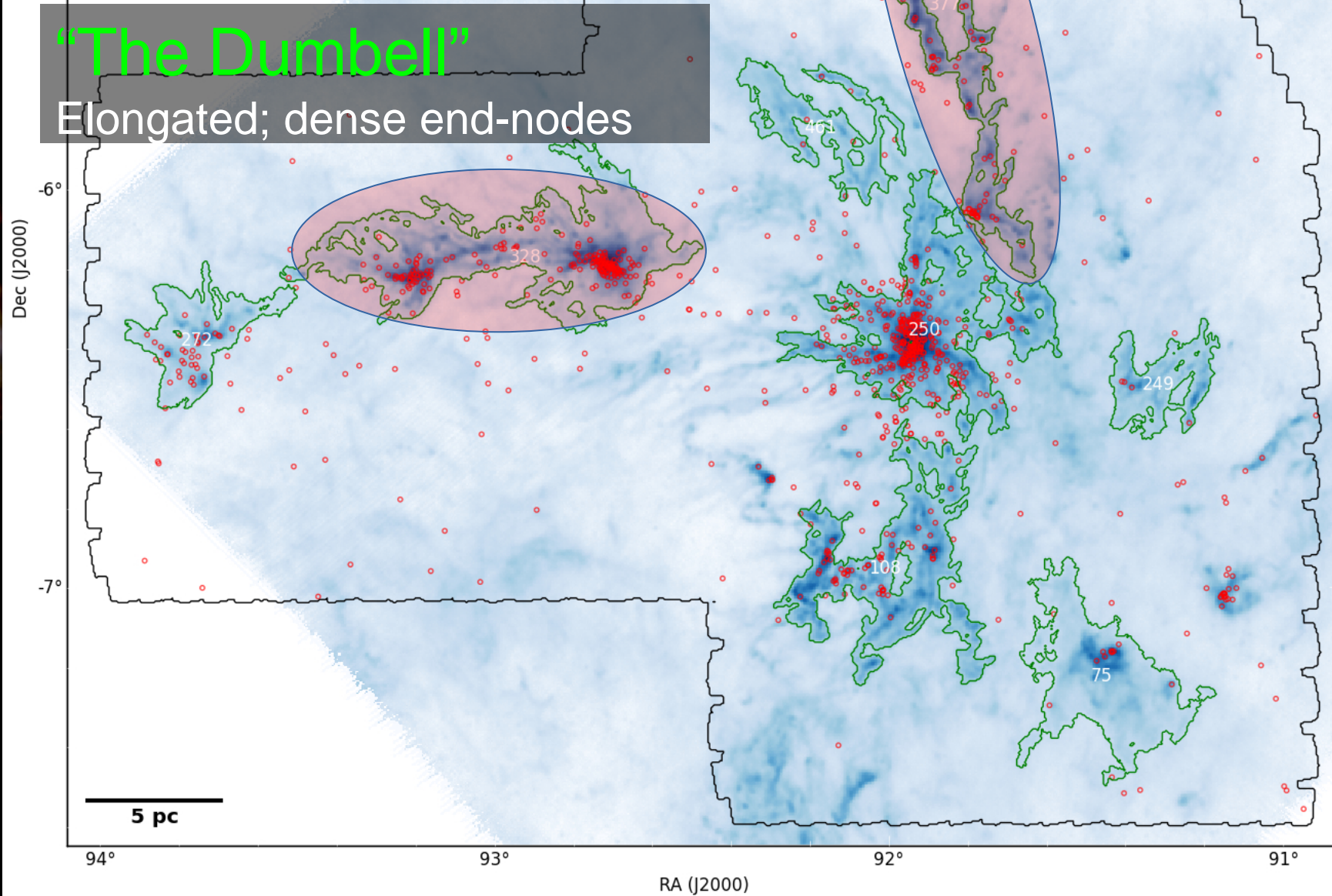
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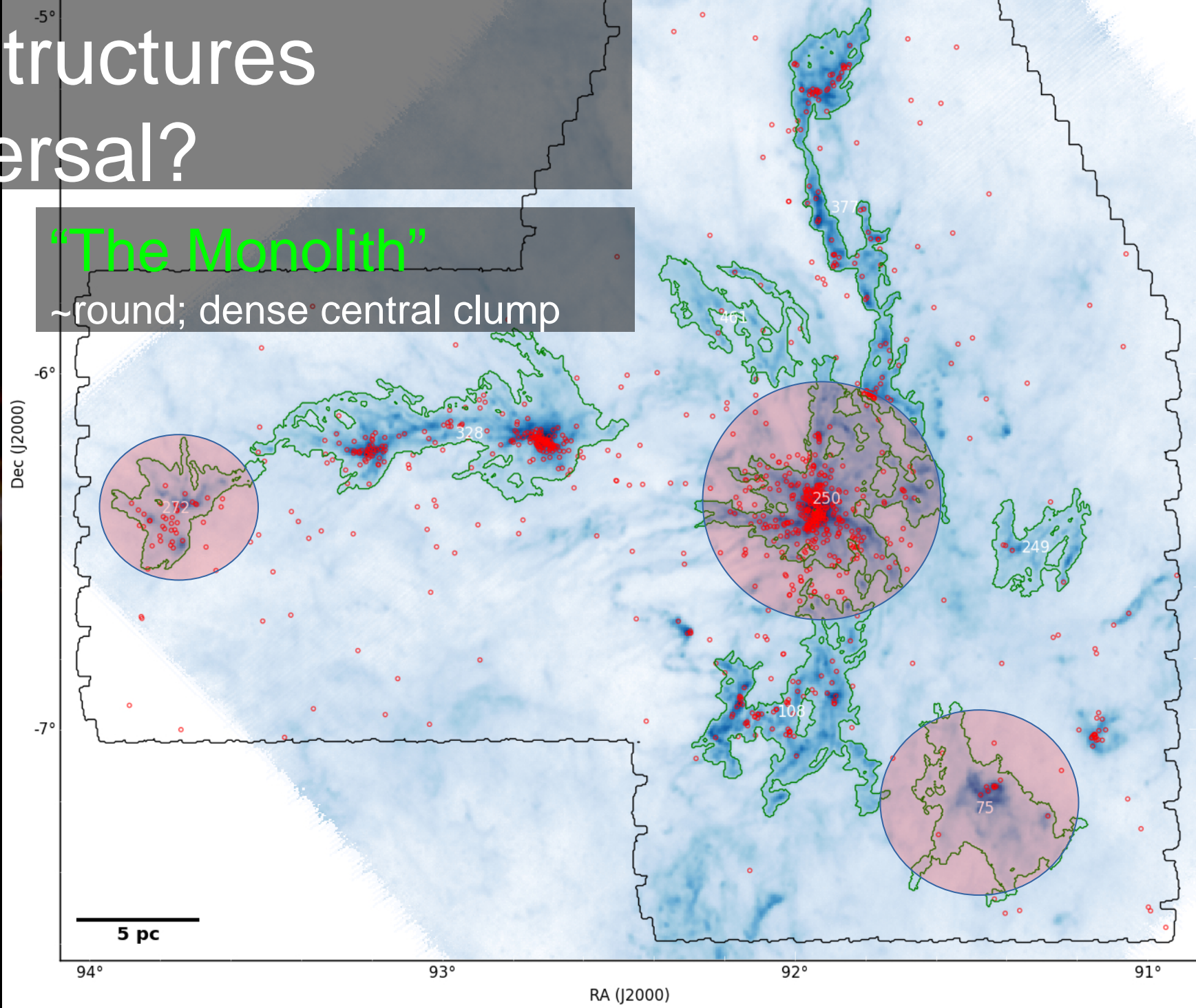




# Are MonR2 Filaments Substructures Universal?



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**"The Monolith"**

~round; dense central clump

Dec (J2000)

-6°

-7°

94°

93°

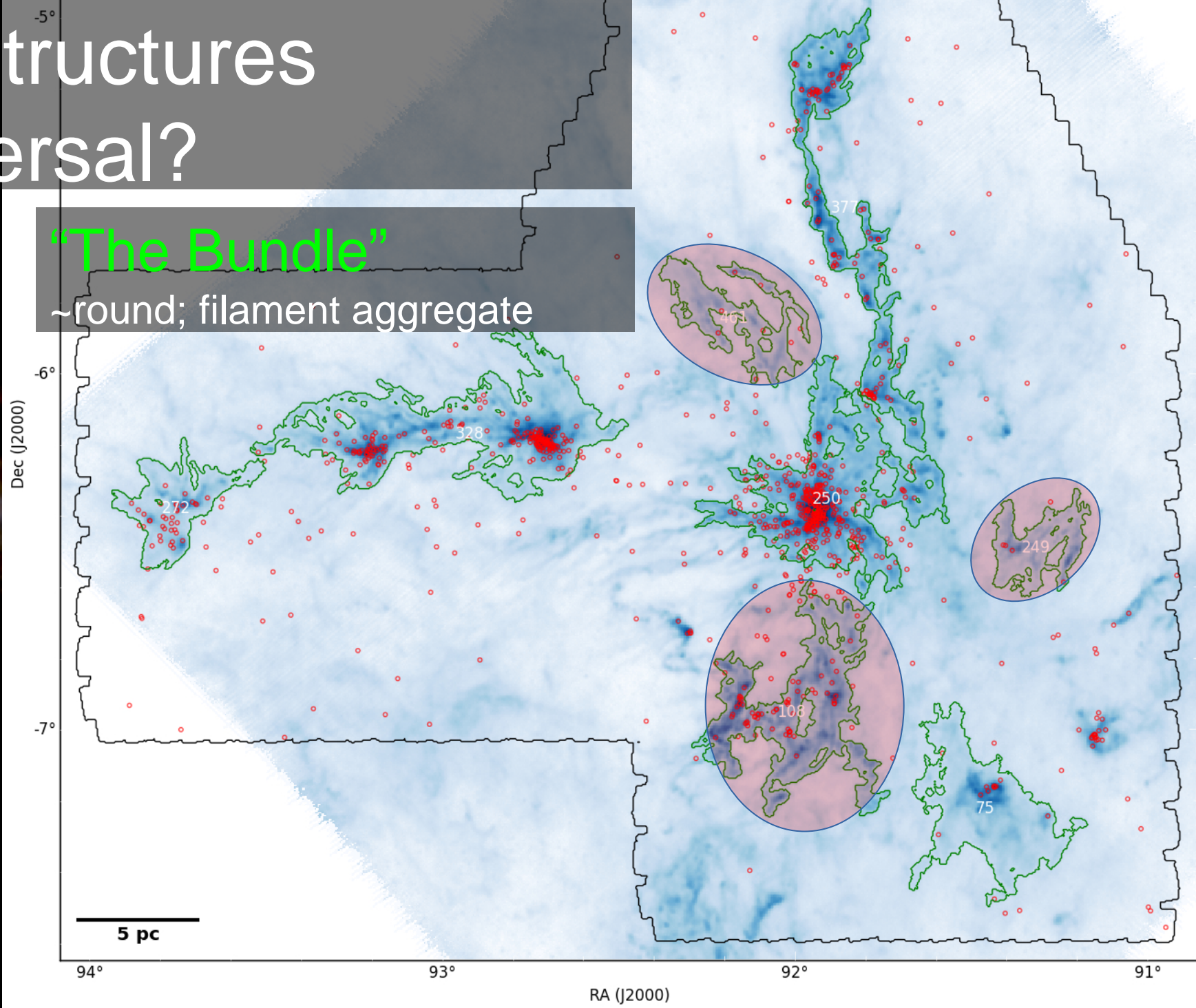
92°

91°

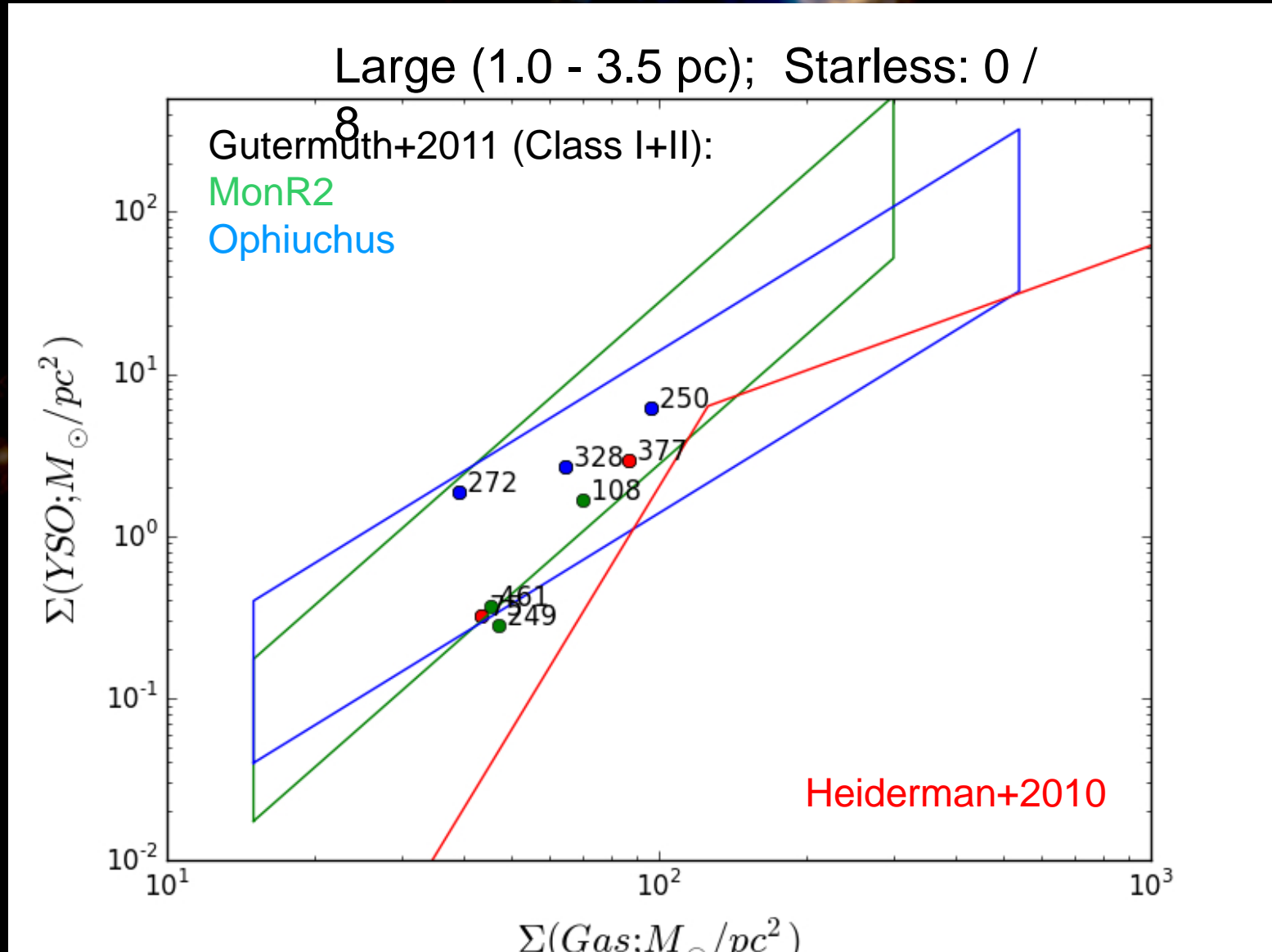
RA (J2000)

5 pc

# Are MonR2 Filaments Substructures Universal?

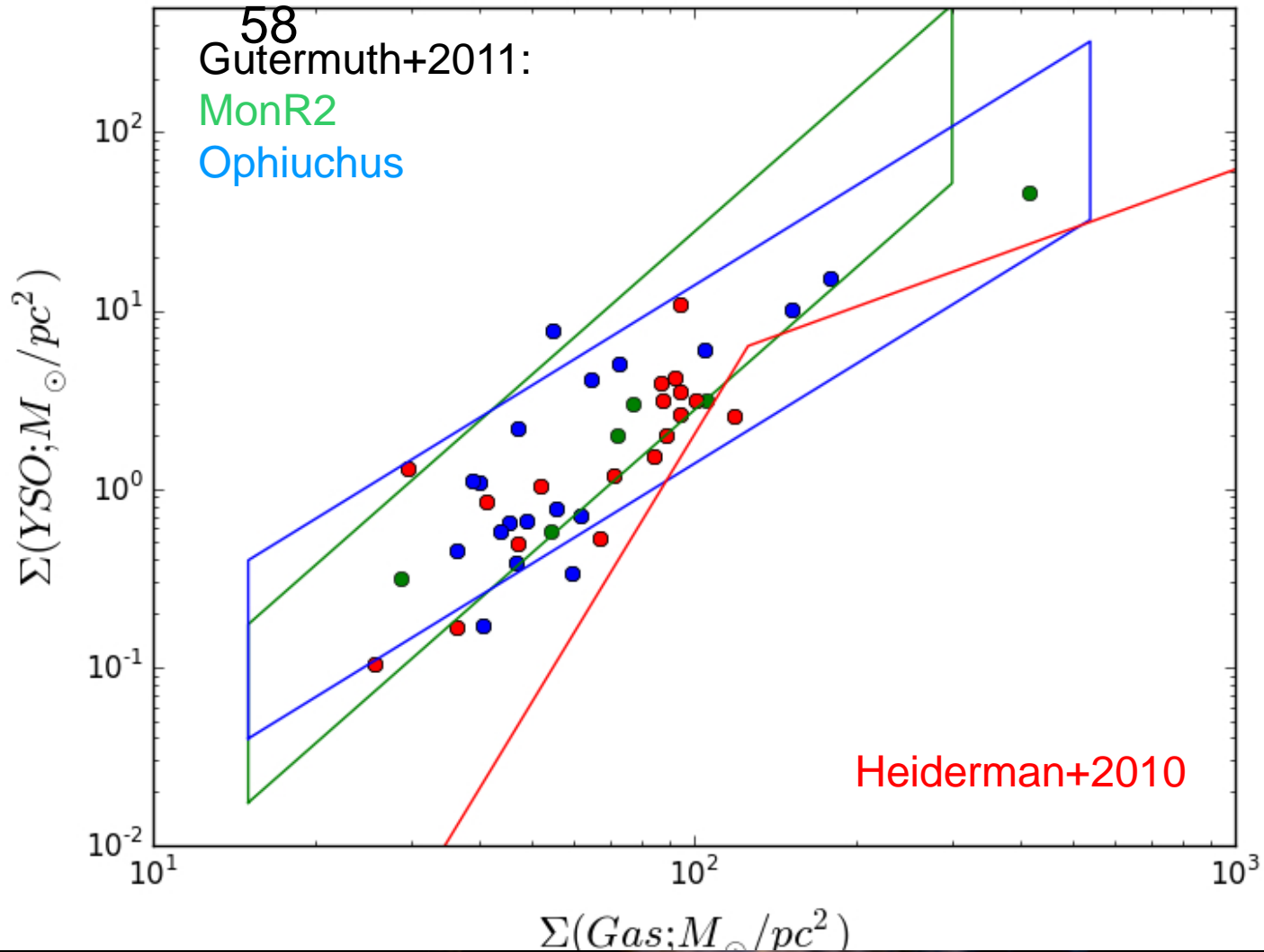


# Taxonomic Role in SF?



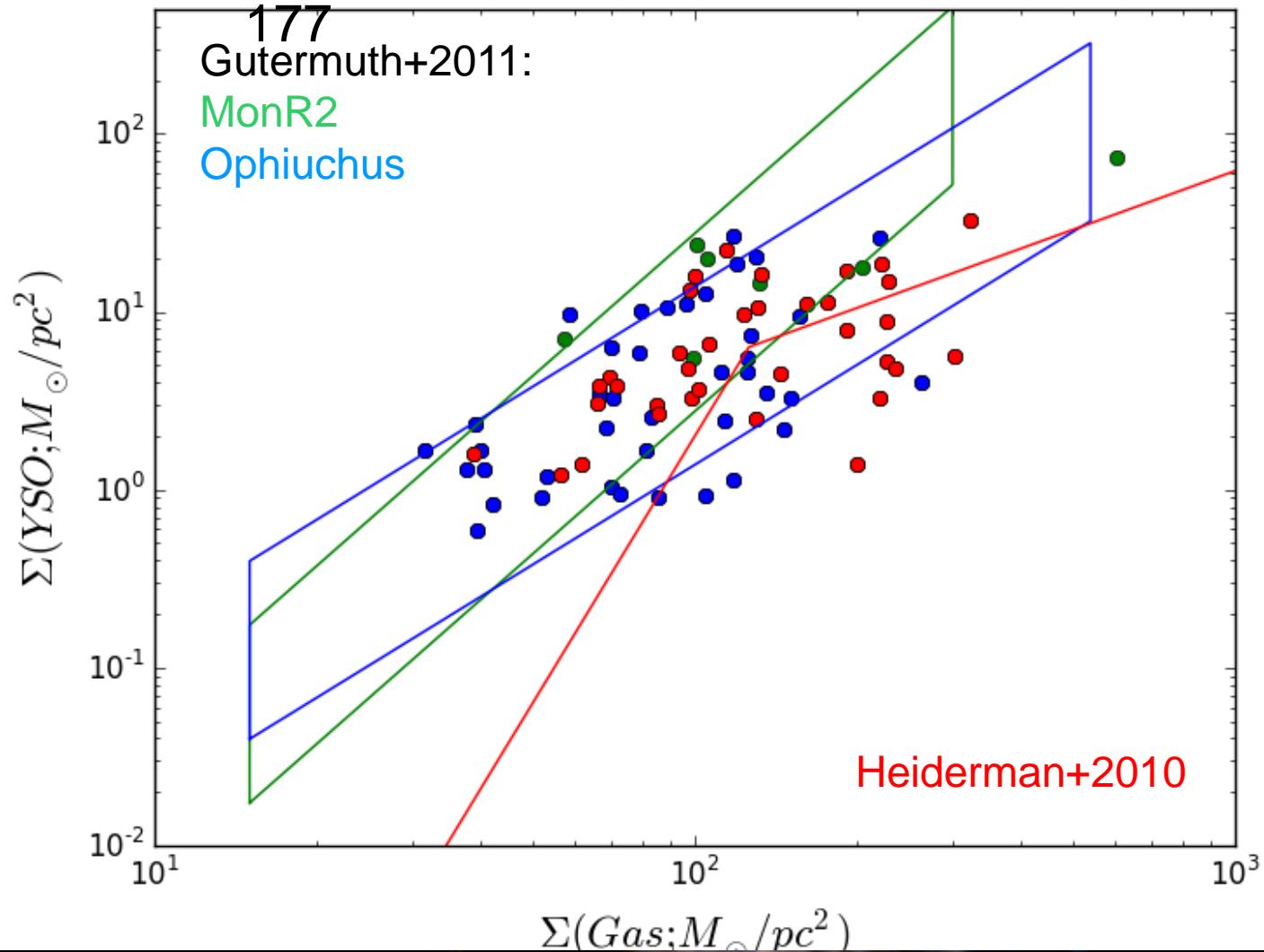
# Taxonomic Role in SF?

Medium (0.35 - 1.0 pc); Starless: 11 /



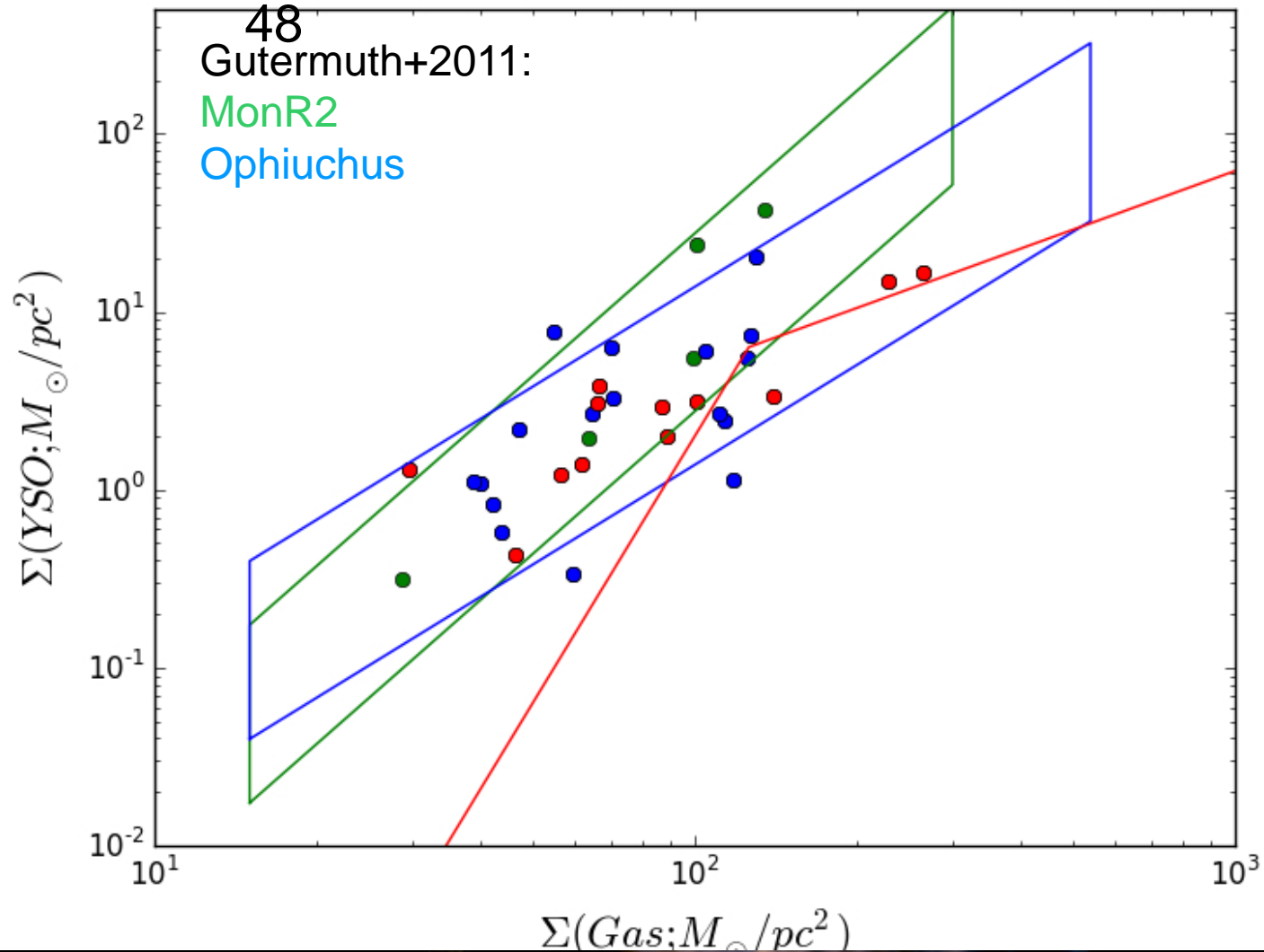
# Taxonomic Role in SF?

Small (0.1 - 0.35 pc); Starless: 94 /



# Taxonomic Role in SF?

“Filaments” (AR > 3); Starless: 14 /



# Wrap it up, Rob!

In MonR2-SPIRE:

- Most structures are not elongated

- ...yet most denser gas found in elongated structures of some scale.

- Configuration and size (0.1-3pc) of structures don't appear to affect star-gas column density correlation.



LMT/AzTEC 1.1mm survey proposed.

Yes, THAT LMT!  
It's working at  
32m (8" @ 1.1mm)!