The Mass and Size of Clouds and Cores

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Dense Cores in Dark Clouds LXV
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Main Contributors

Thushara Pillai, Rahul Shetty, Phil Myers

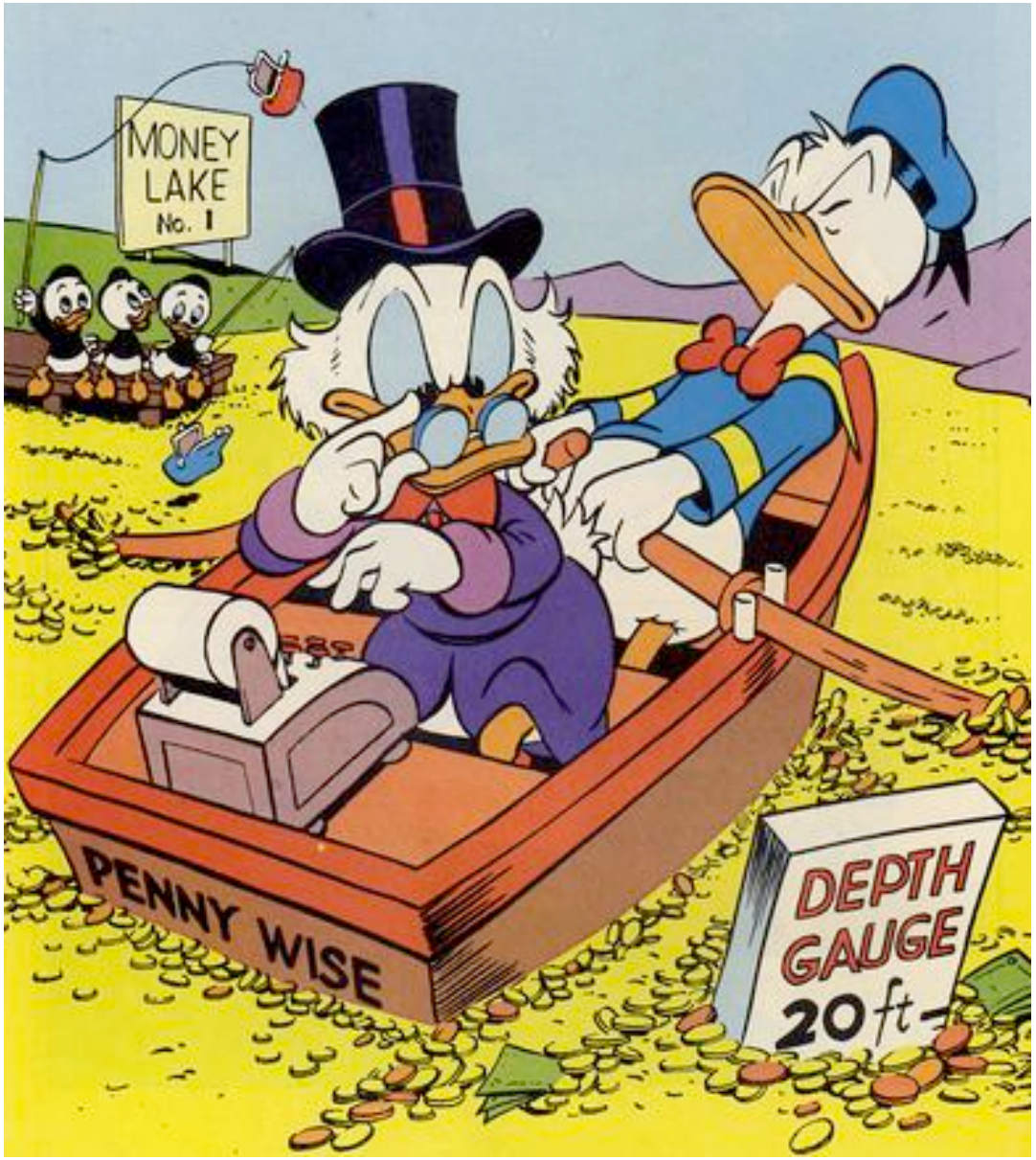
COMPLETE Members

Alyssa Goodman, Jonathan Foster, Jaime Pineda, Erik Rosolowsky

Big Questions in Star Formation Research

the most fundamental question of star formation research...

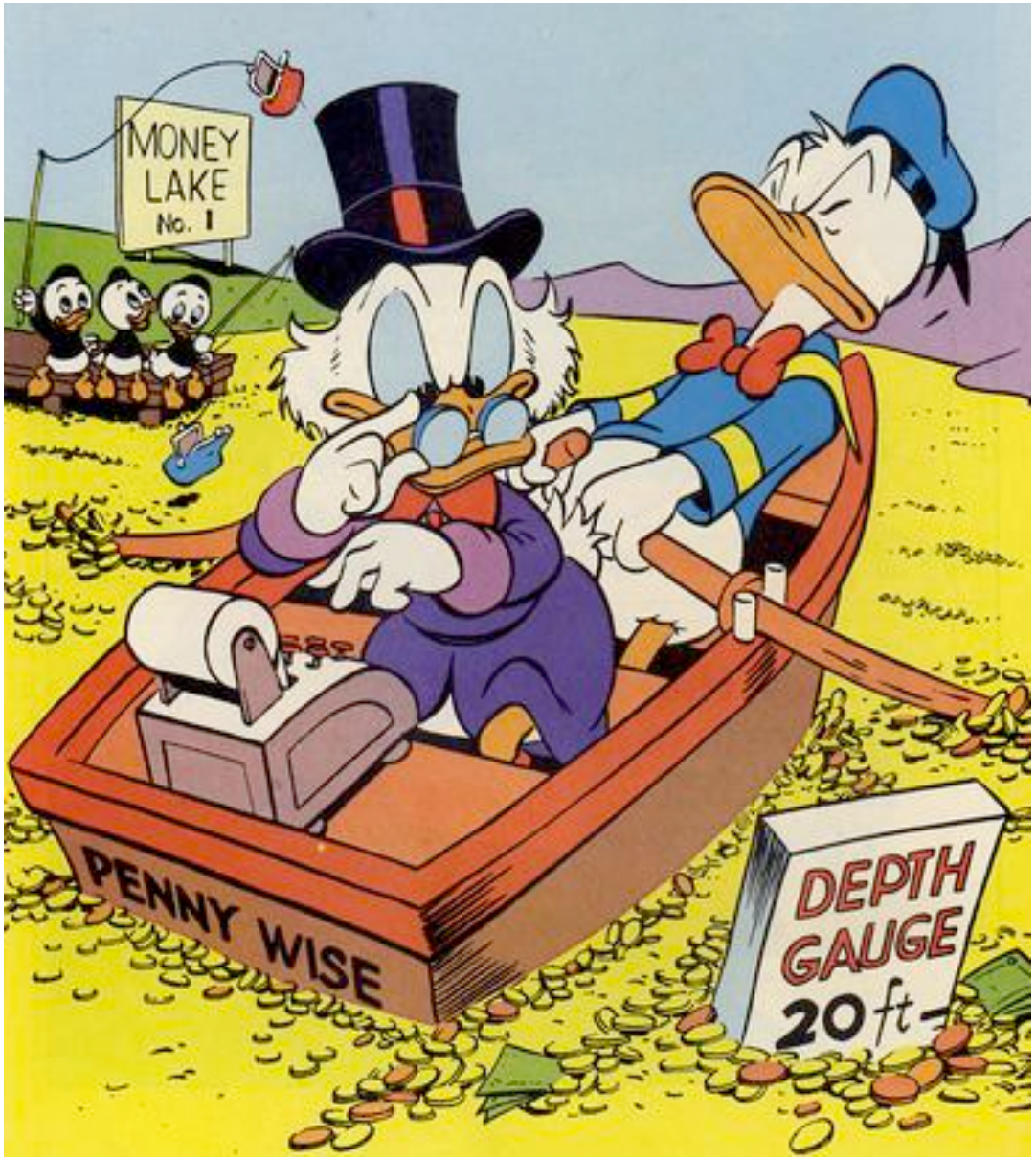
Big Questions in Star Formation Research



the most fundamental question of star formation research...

Who is going to pay for it?

Big Questions in Star Formation Research



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Phil's Phrasing

"Constraints on Dense Core Evolution"

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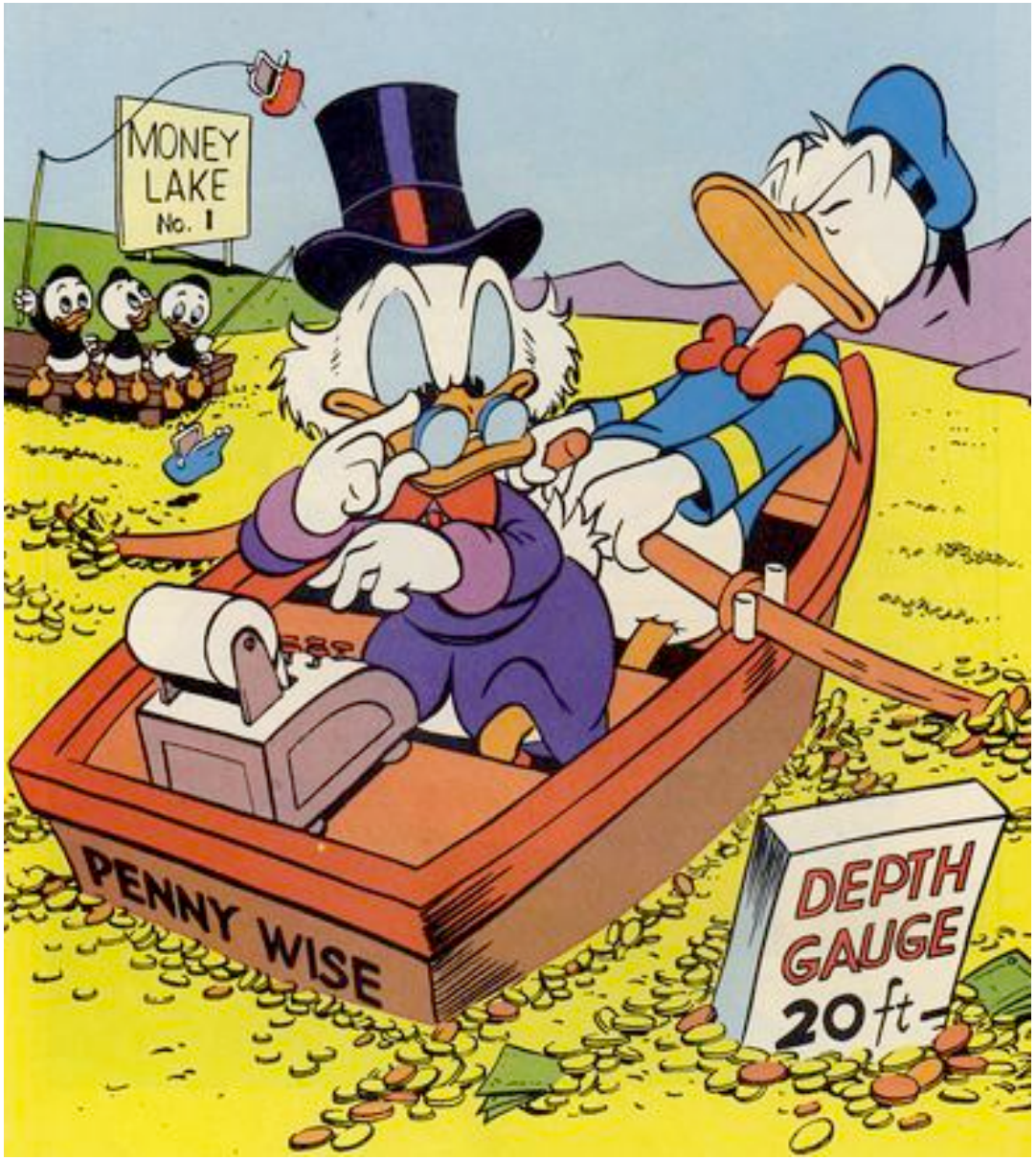

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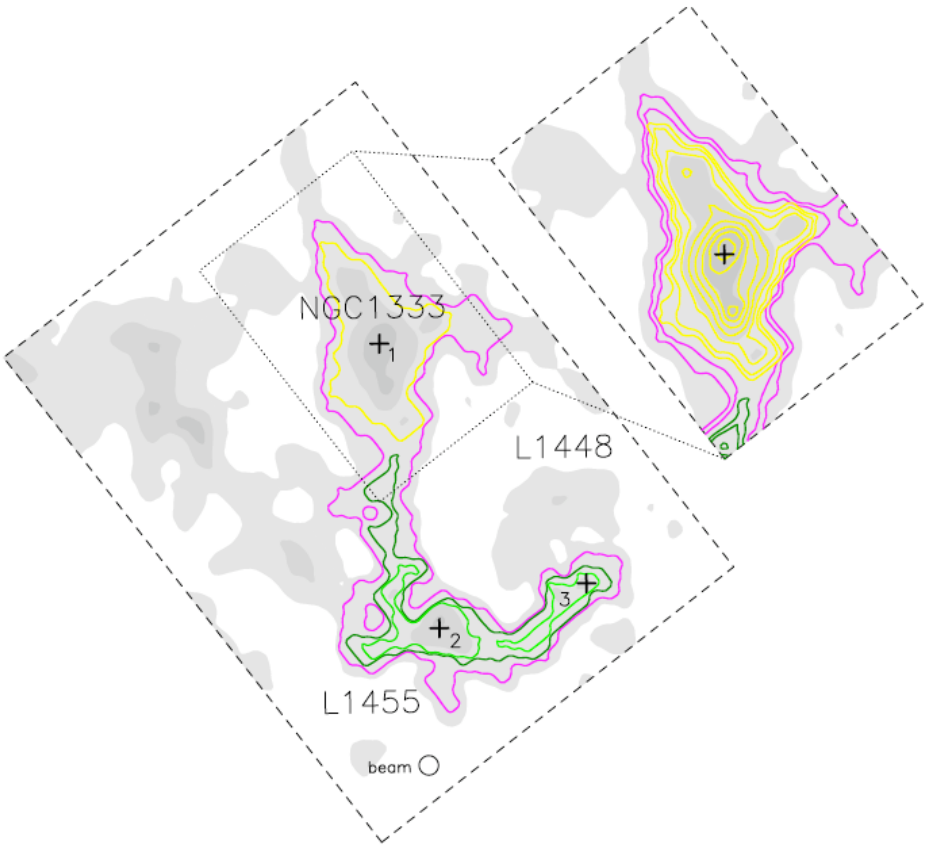
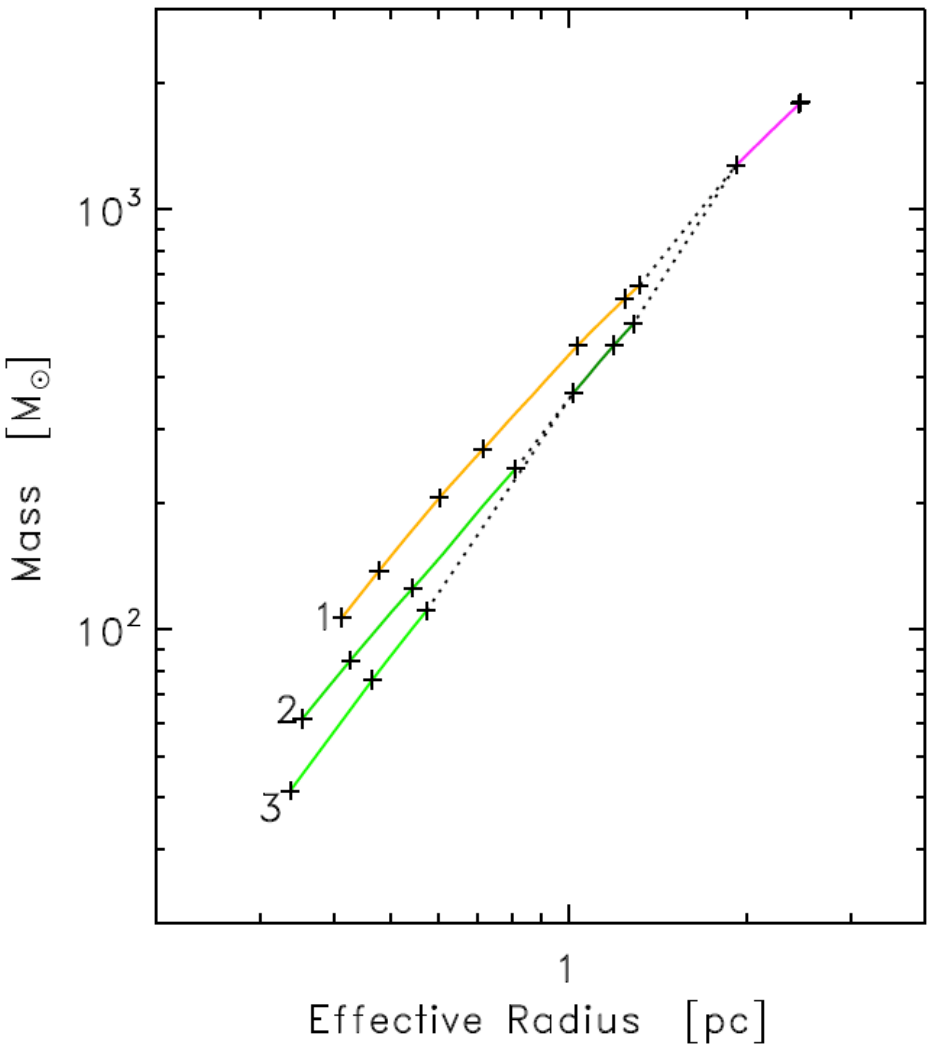
funding for Alyssa!

Fundamental Approach: More than one Scale





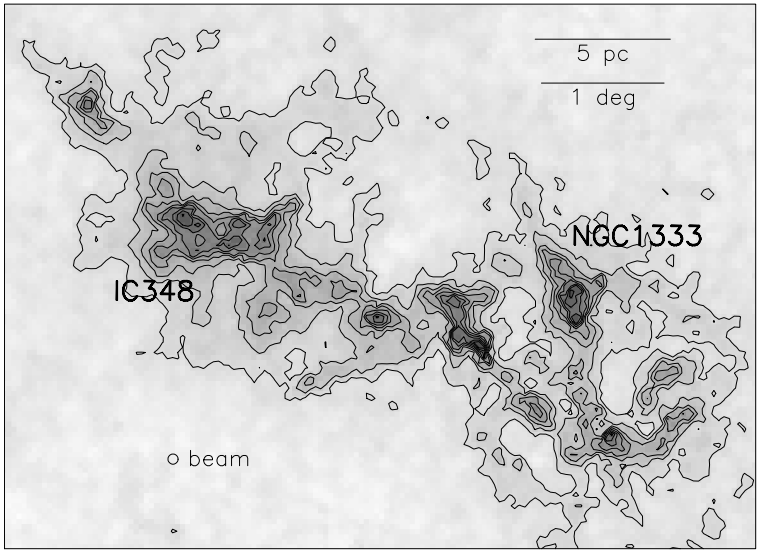
effective radius: $r = (A/\pi)^{1/2}$

Kauffmann et al.

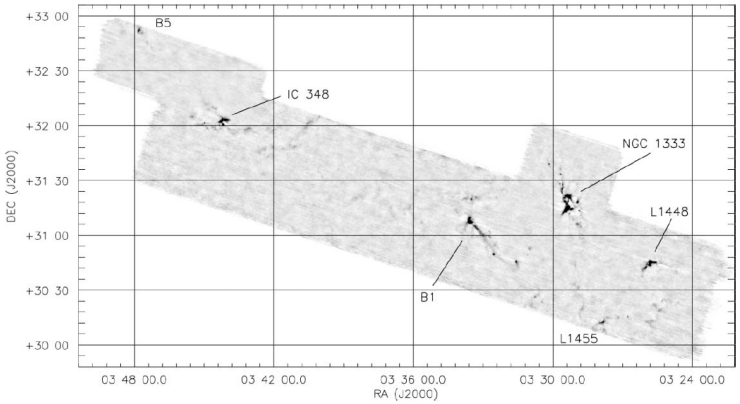
also see Rosolowsky et al. (2008)

Combining Data Sets

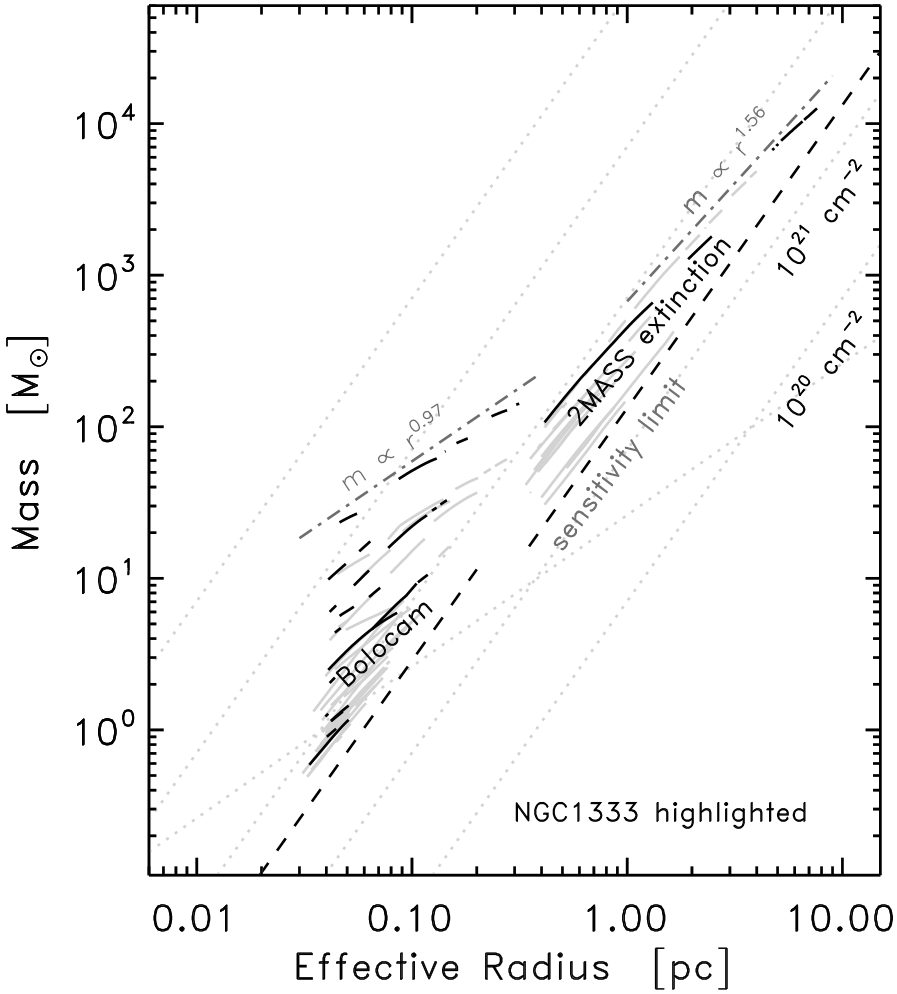
2MASS extinction map:



Bolocam (Enoch et al. 2006):

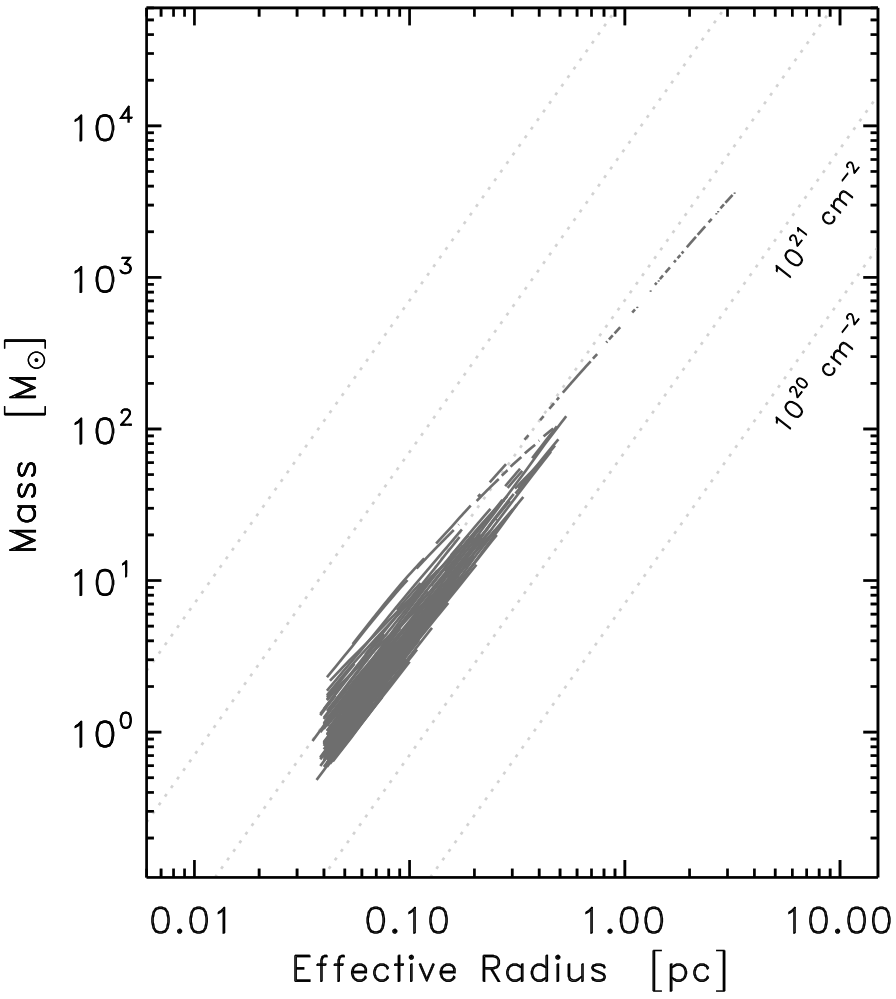


combined & aligned data:



Some Example Clouds

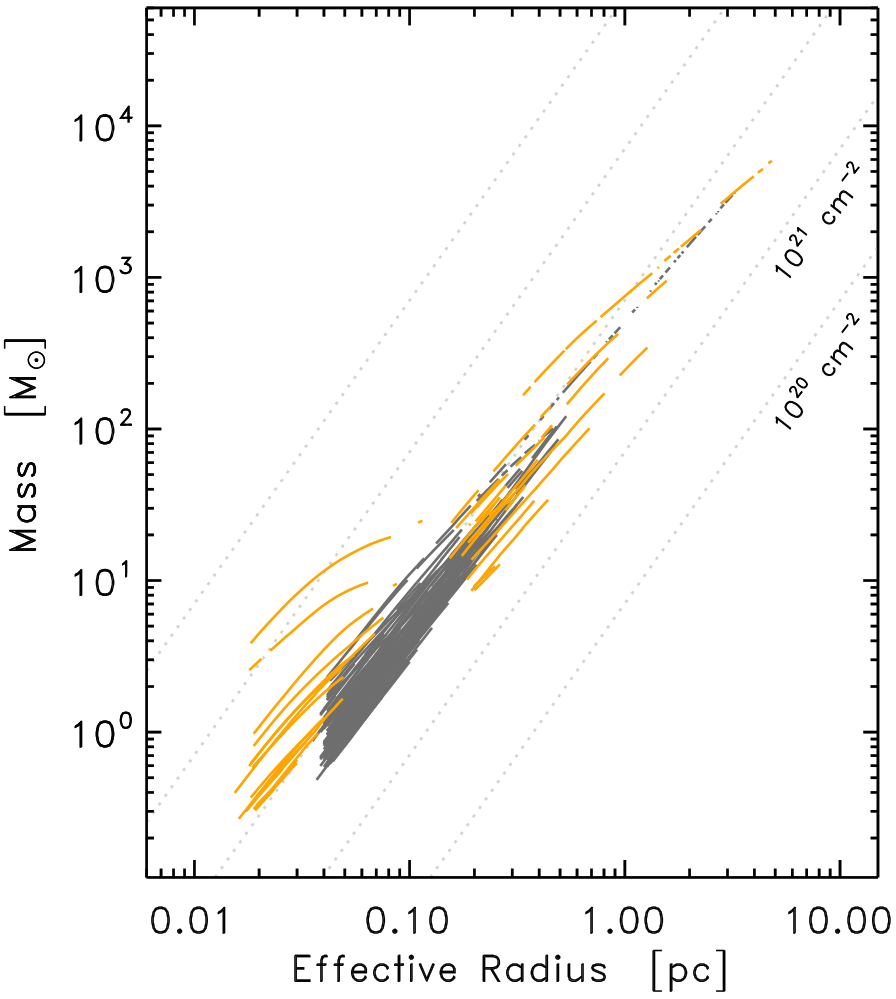
Pipe



data: Ridge et al., Enoch et al., Lombardi et al., Kauffmann et al., Pillai et al., Rowles & Froebrich, Nutter & Ward-Thompson, Bally et al.

Some Example Clouds

Pipe • Ophiuchus



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requires sufficient mass at small radii

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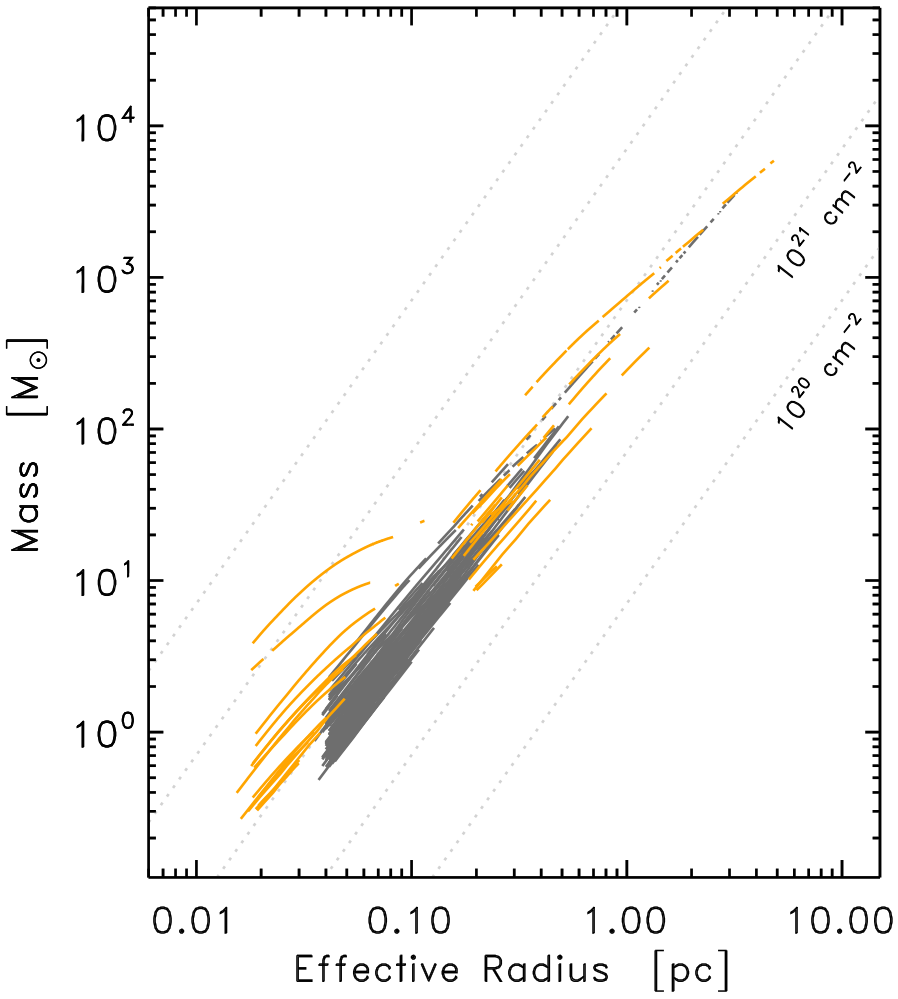

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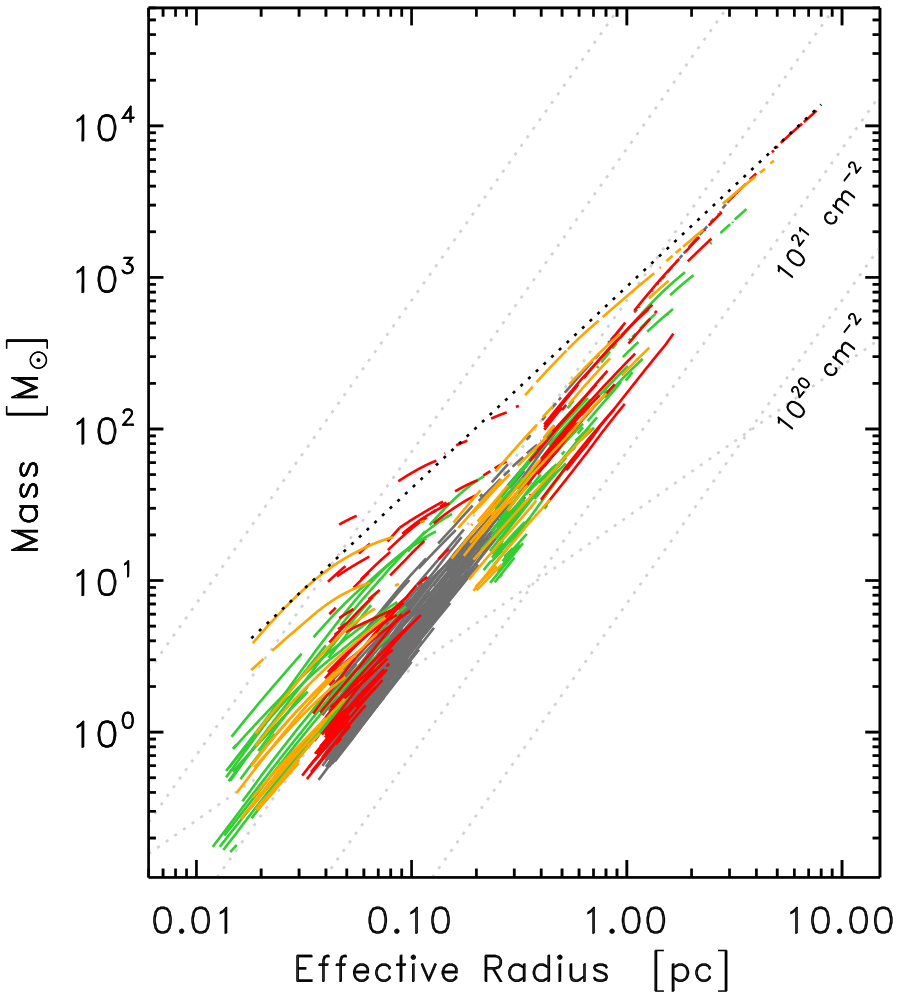
Some Example Clouds

Pipe • Ophiuchus • Perseus • Taurus



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mass-size limit for low-mass clouds:
$m(r) = 870\, M_\odot\, (r/\mathrm{pc})^{1.33}$

data: Ridge et al., Enoch et al., Lombardi et al., Kauffmann et al., Pillai et al., Rowles & Froebrich, Nutter & Ward-Thompson, Bally et al.

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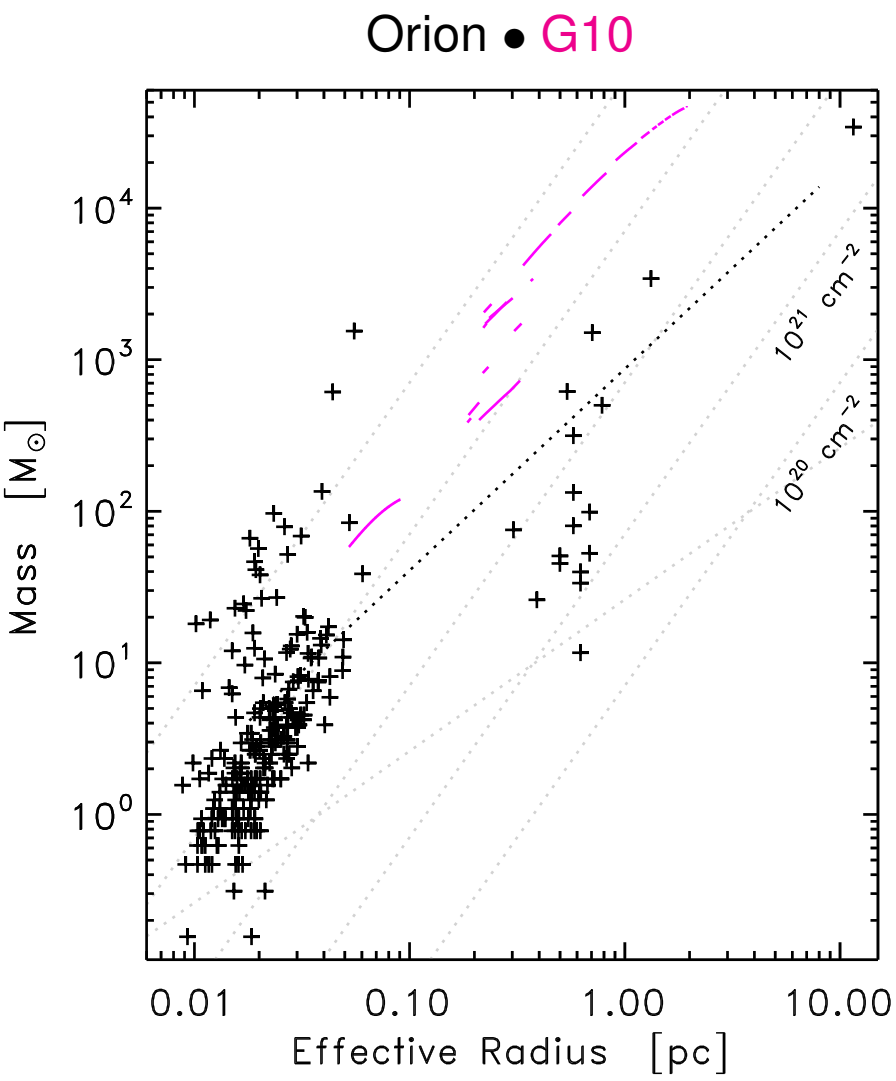

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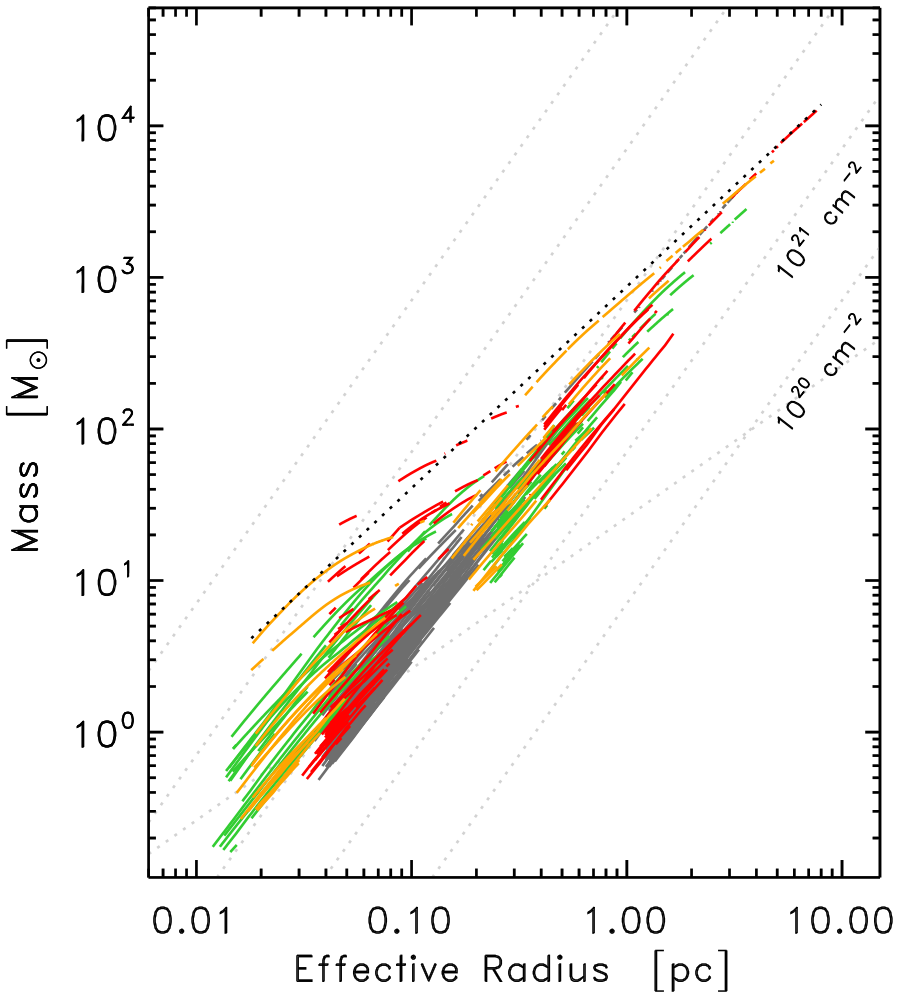

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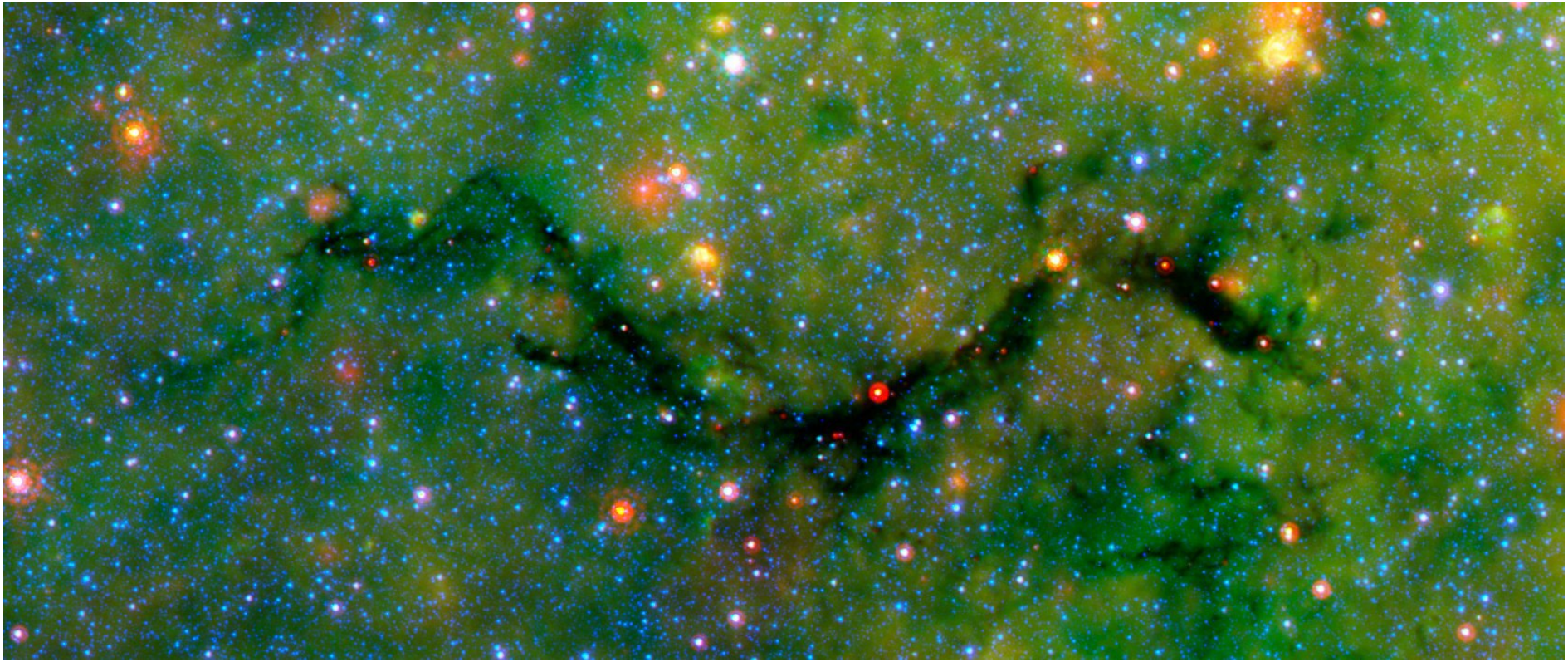
Cloud Characterization

by slope and intercept

...has theoretical implications

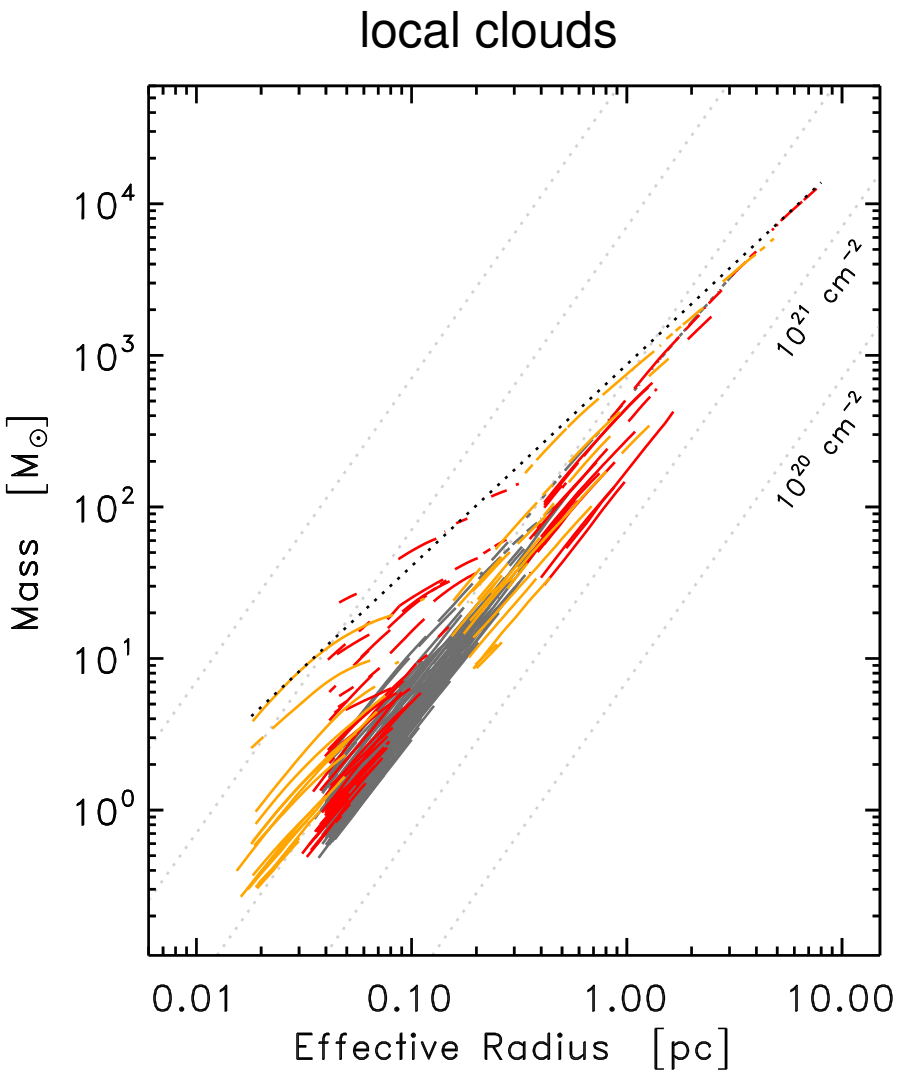
Infrared Dark Clouds



S. Carey

Kauffmann & Pillai

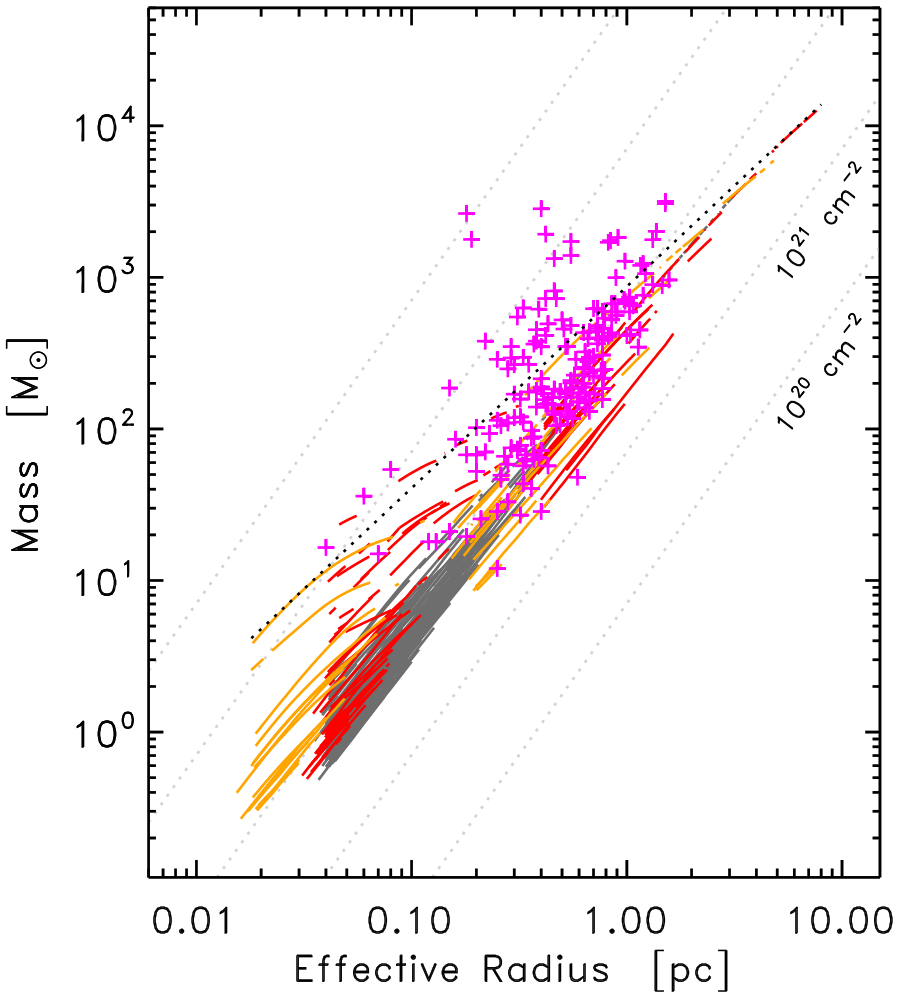
Infrared Dark Clouds vs. Local Templates



where do IRDCs reside in this diagram?

Infrared Dark Clouds vs. Local Templates

Rathborne et al.



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Rathborne et al. (2006):
75% of the cores are tenuous

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Infrared Dark Clouds vs. Local Templates

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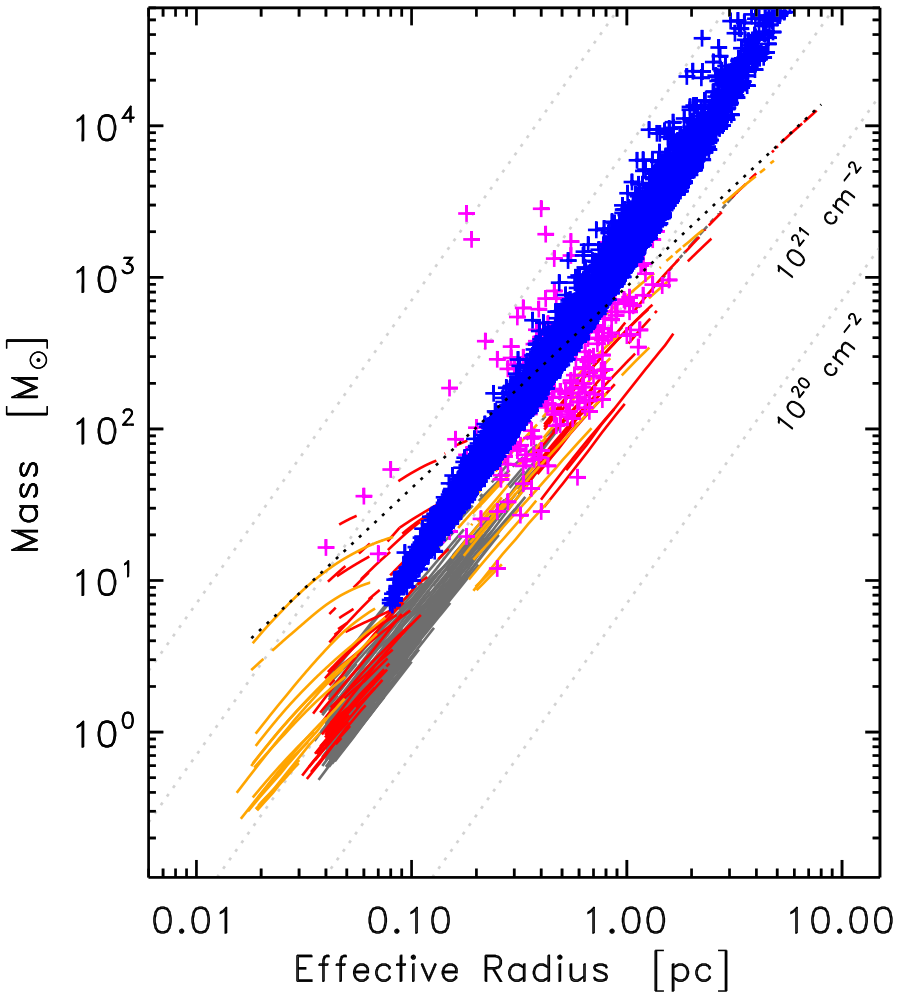

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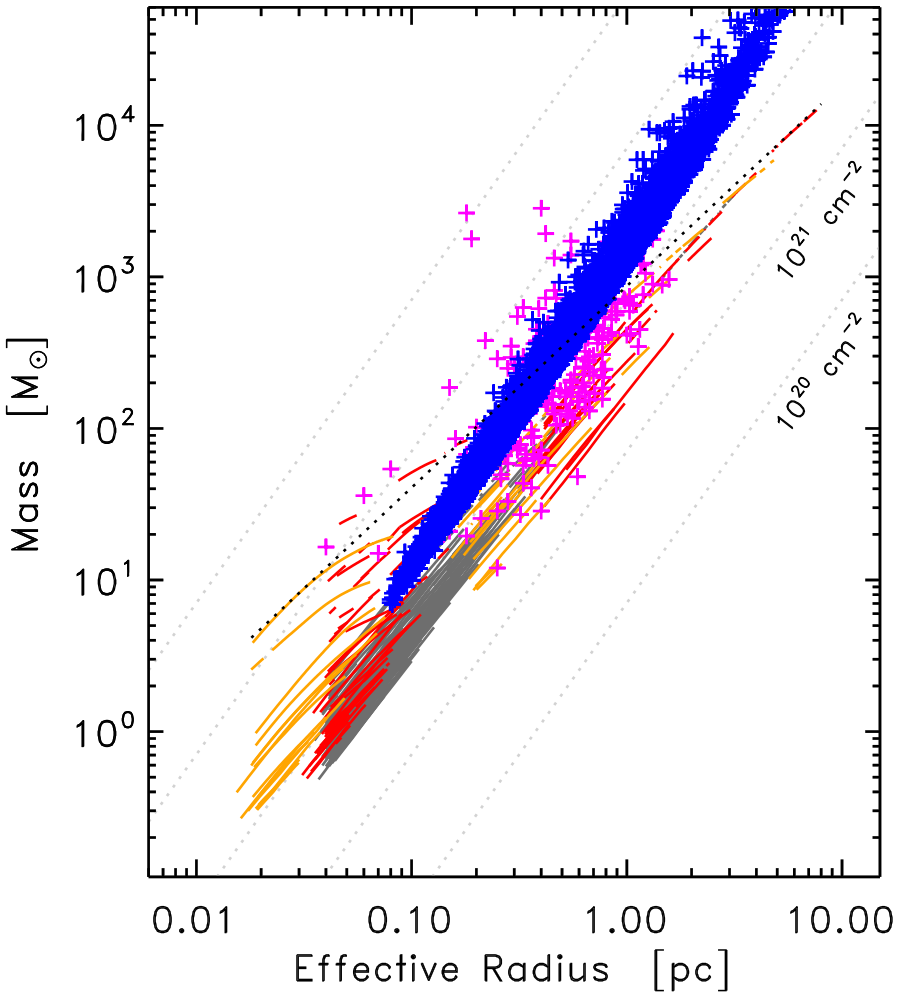

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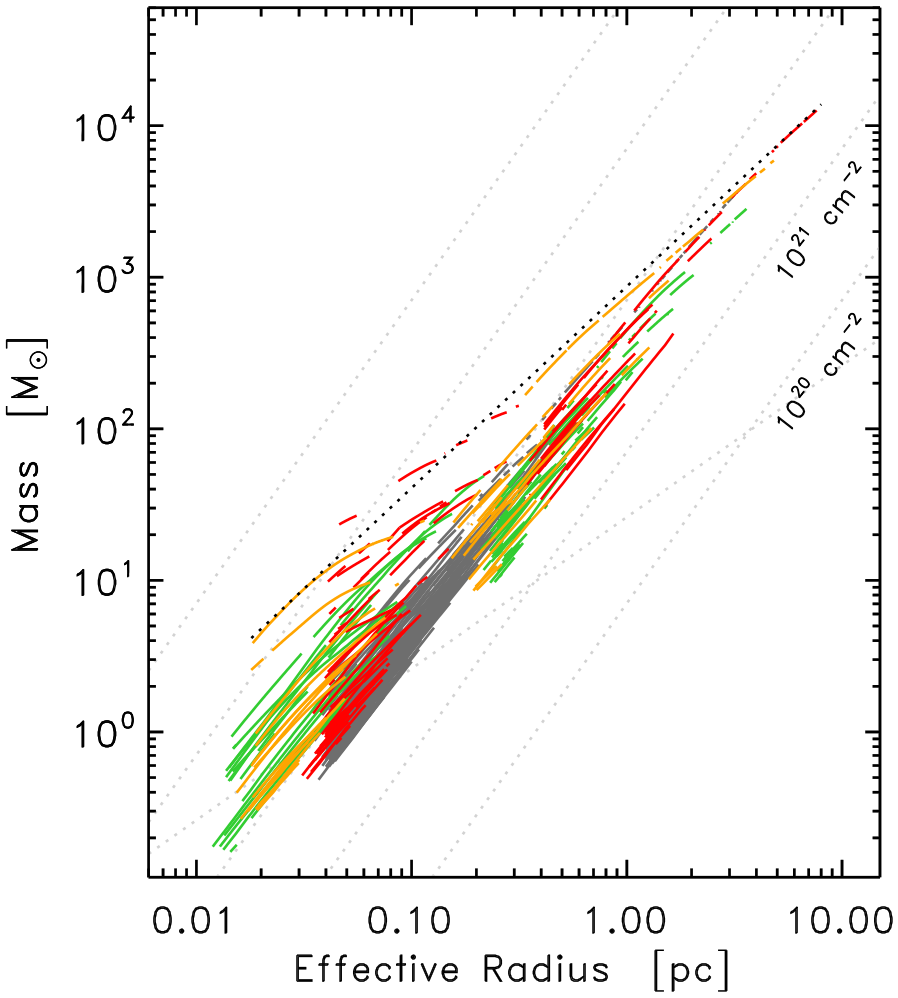
Average IRDCs

- most are not compact
- not a homogeneous group

200 most compact clouds contain $\sim$ 50% of mass

Summary

Pipe • Ophiuchus • Perseus • Taurus



Cloud Characterization

by slope and intercept

$$m(r) = m_0 \, (r/\mathrm{pc})^b$$

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