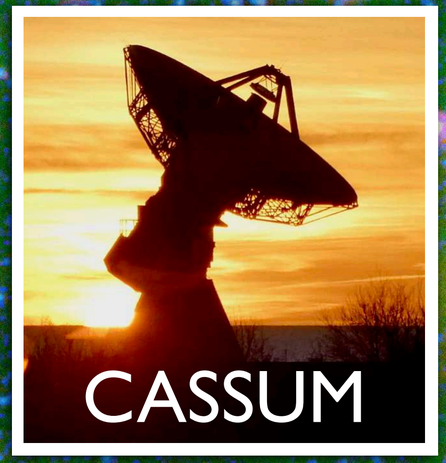
Infrared Light in the Dark
Hunting for Protostars in IRDCs



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Co-Supervisors: Giuliana Cosentino [2], Jonathan Tan [2][3]
Co-Authors: P. Fernández [4][2], Z. Telkamp [3][2], S. Crow [3][2]
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[4]: Universidad Complutense de Madrid (Spain)
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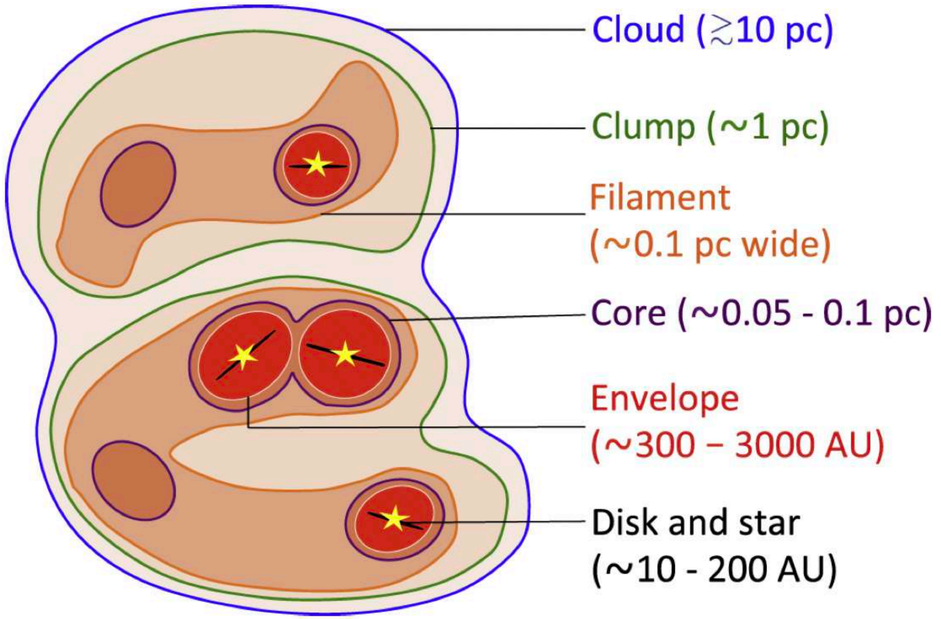
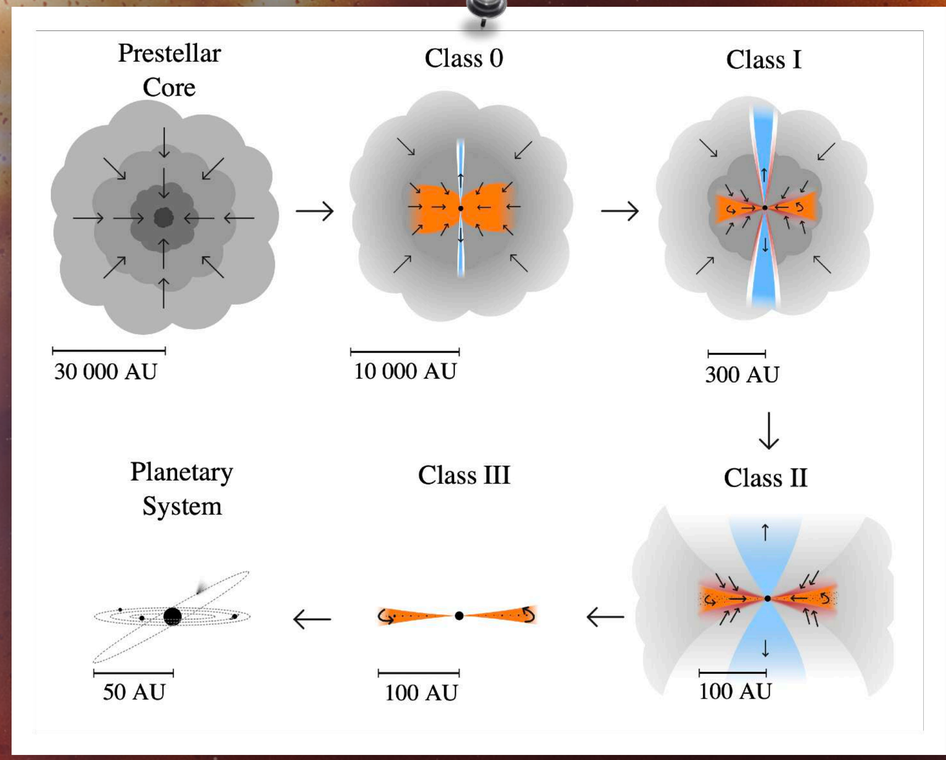
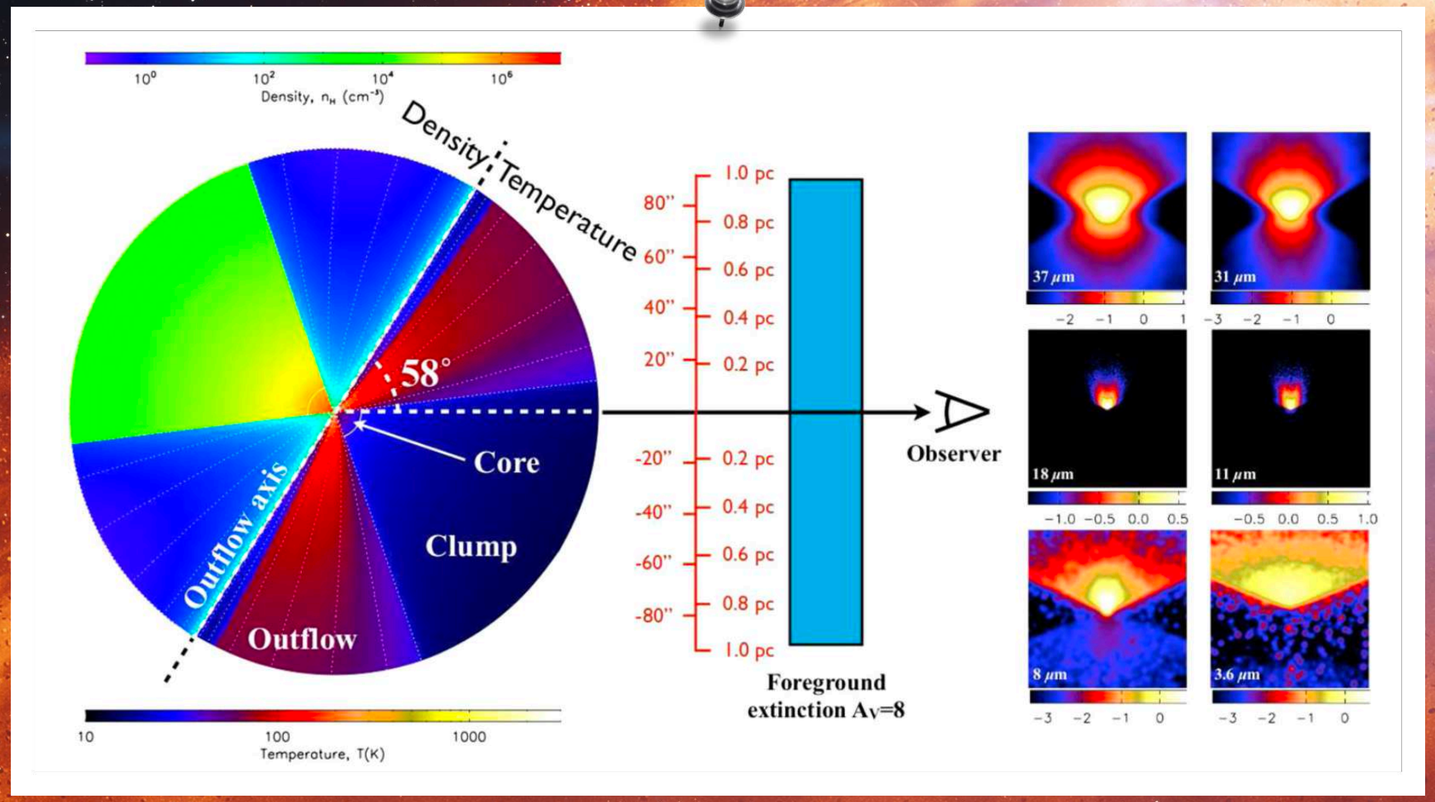
Pokhrel et al. 2018

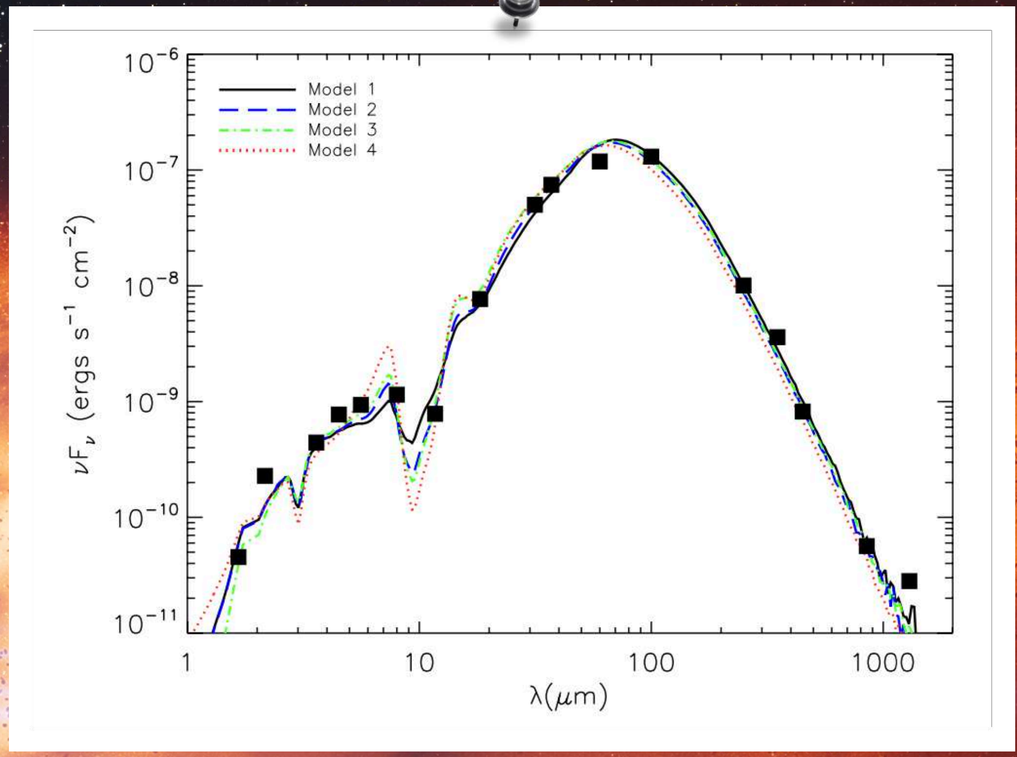




Persson 2018

Zhang et al. 2013

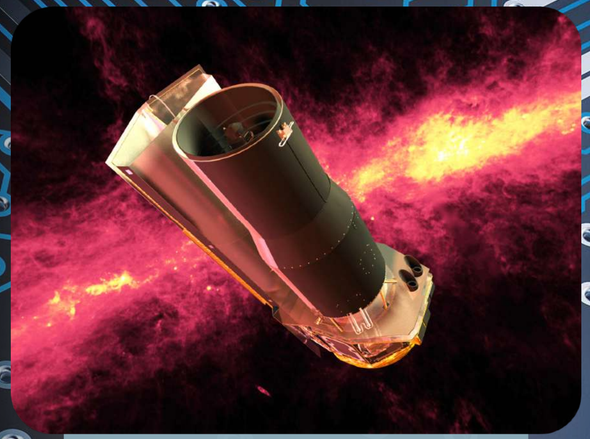




Zhang et al. 2013

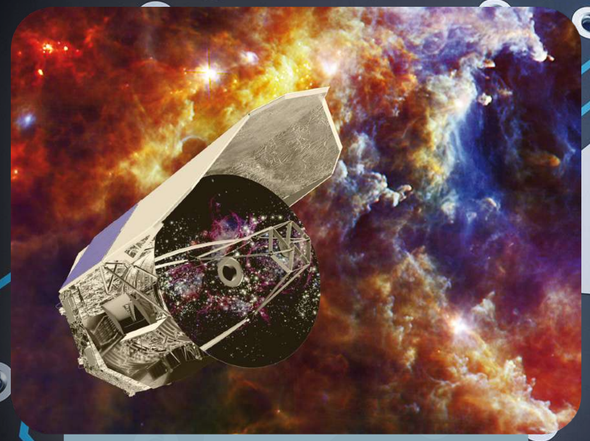
12 Steps Guide

1. Images



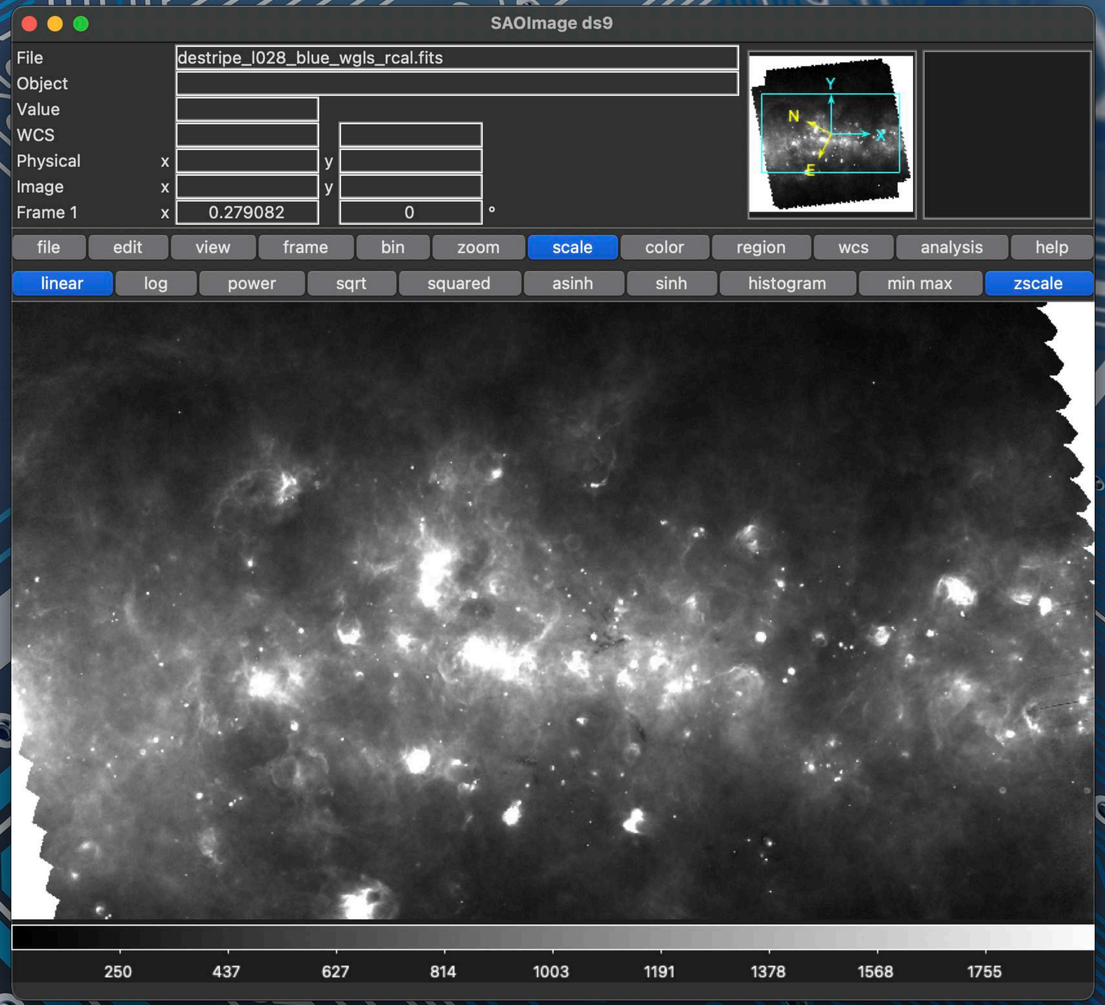
Spitzer

3.6 4.5 5.8 8.0 24 µm



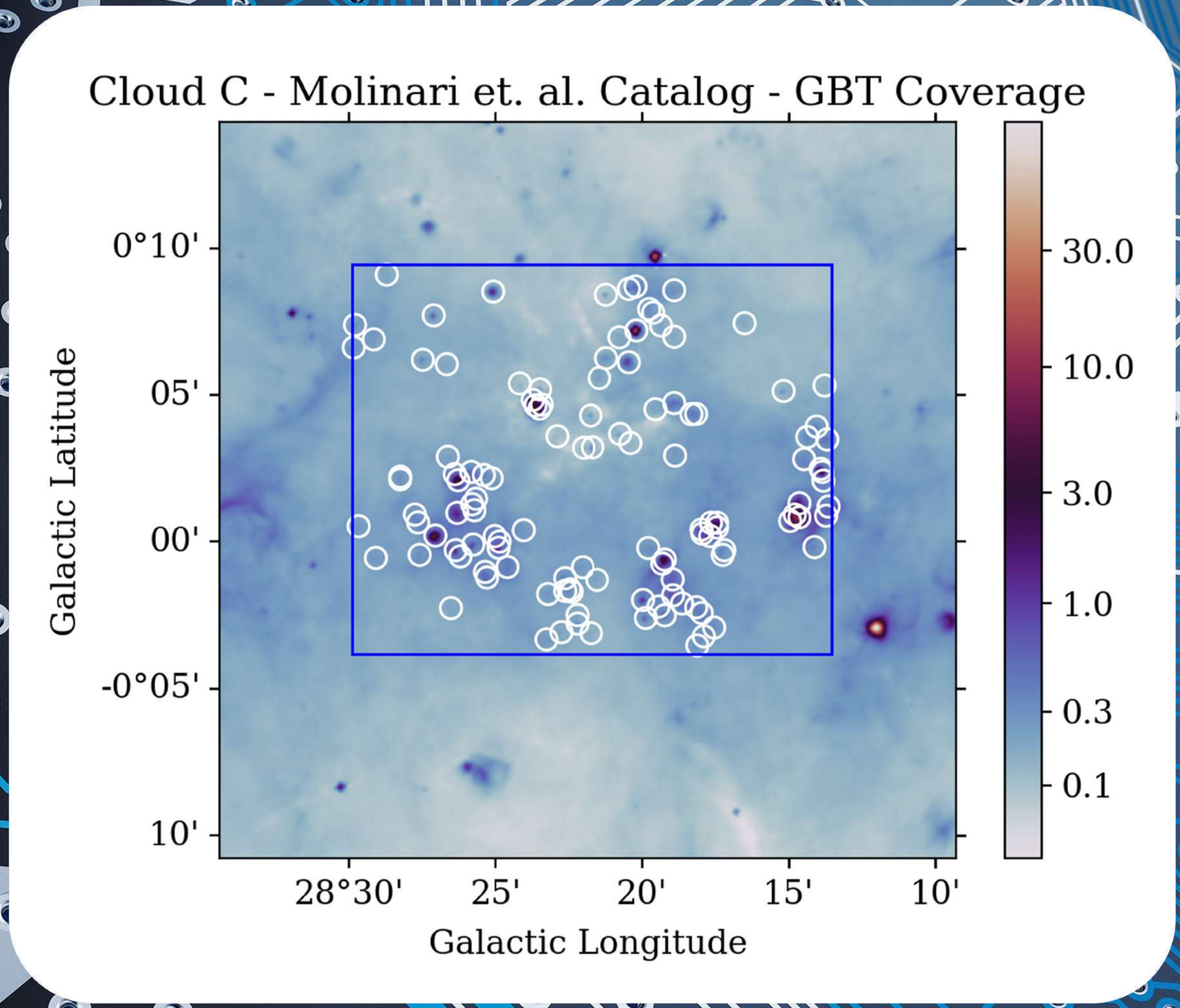
Herschel

70 160 250 350 500 µm



12 Steps Guide

1. Images
2. Sources
3. Filtering



12 Steps Guide

1. Images
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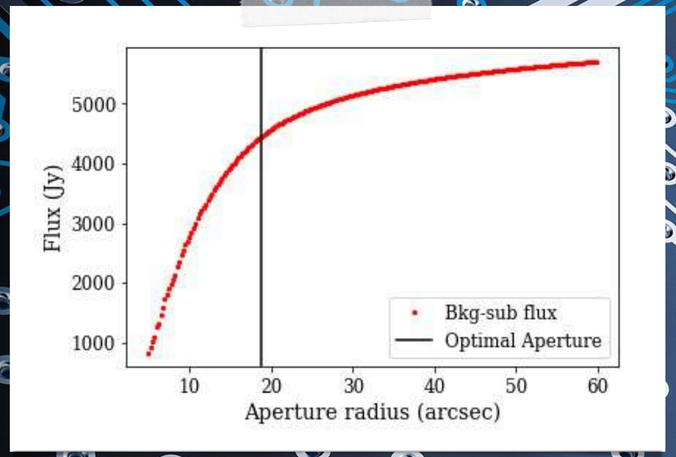
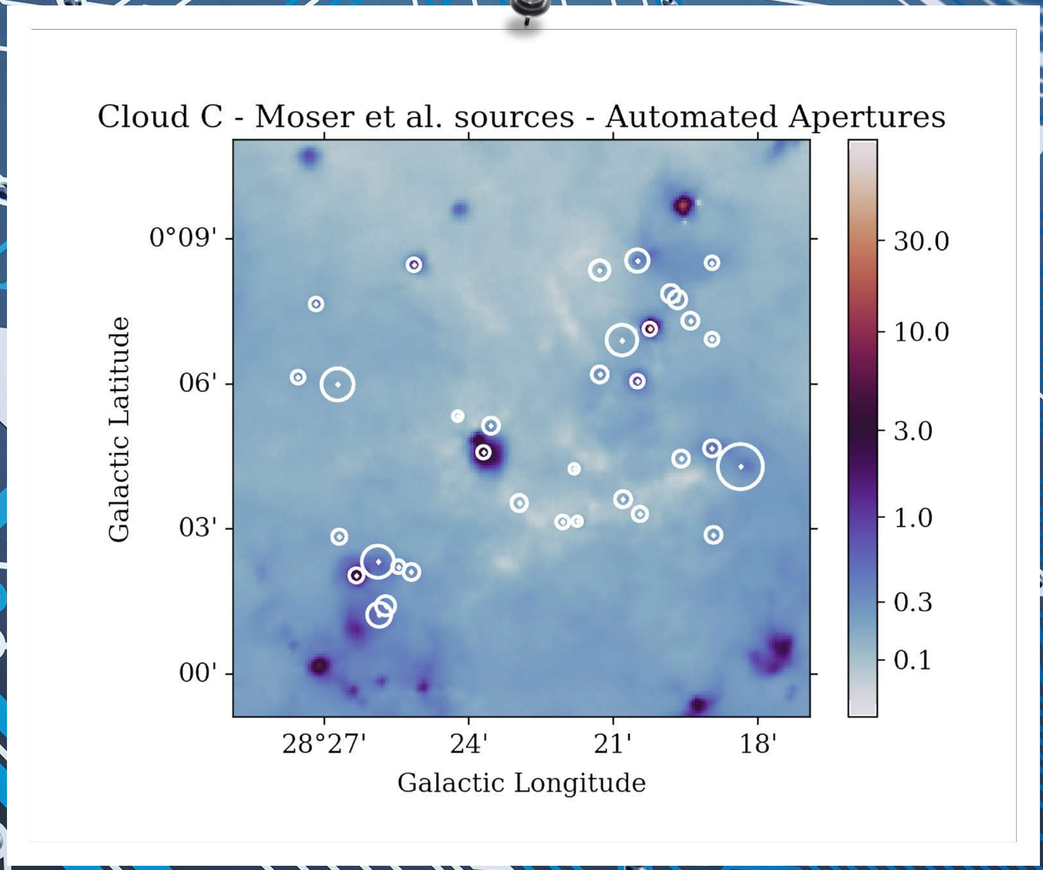
3. Filtering
4. Apertures

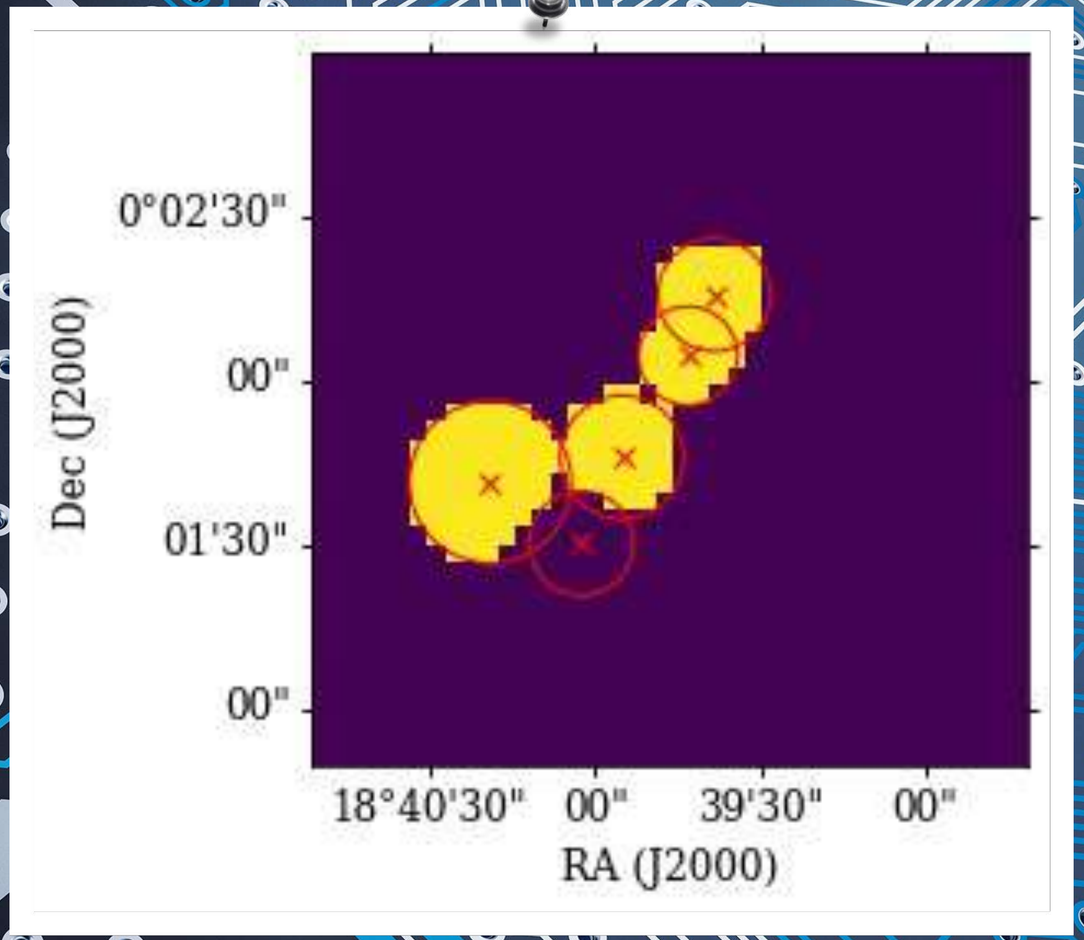




Z. Telkamp et al. in prep.

12 Steps Guide

1. Images
2. Sources
3. Filtering
4. Apertures
5. Masks
6. Regridding



Z. Telkamp et al. in prep.

12 Steps Guide

1. Images
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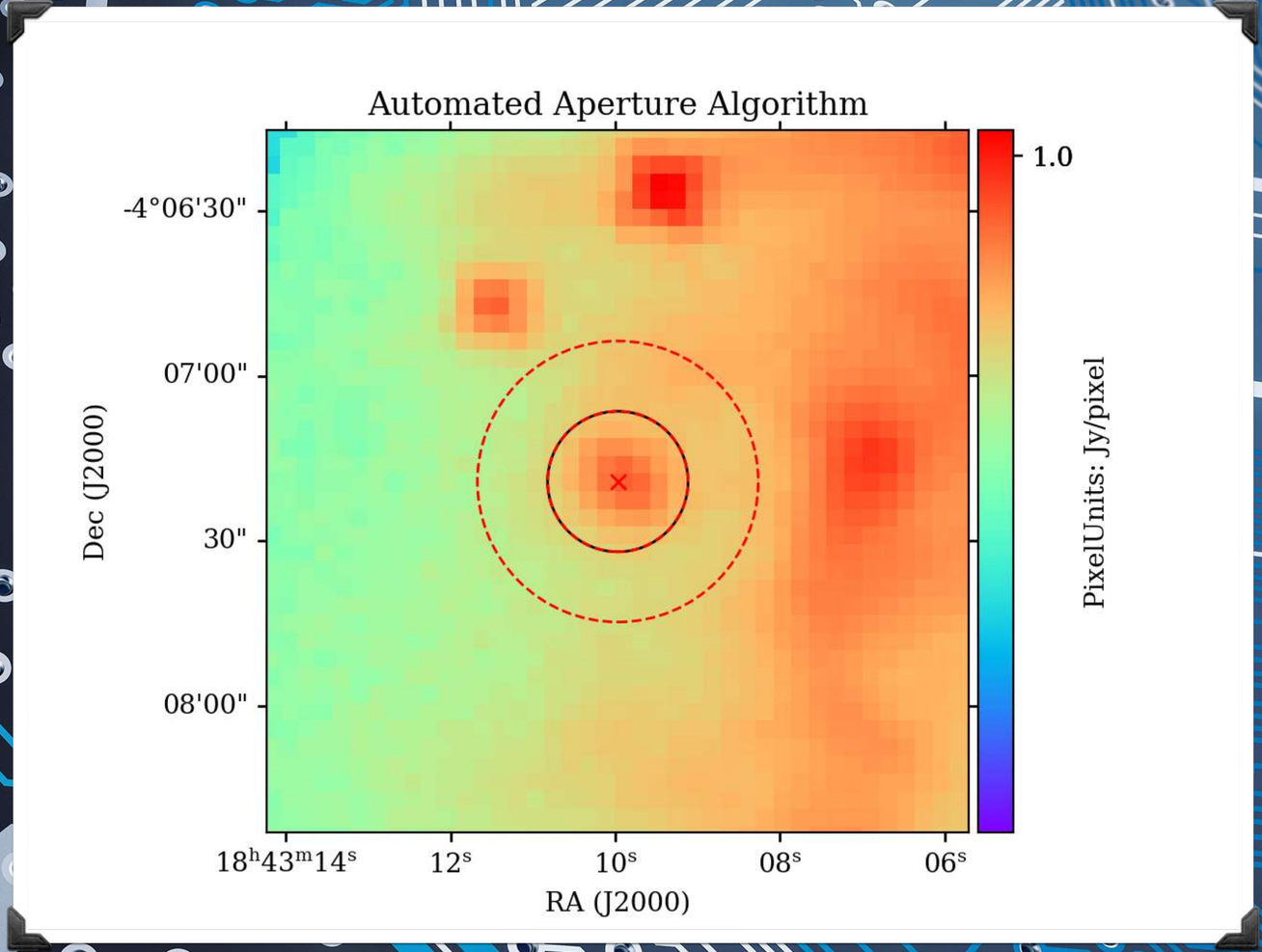
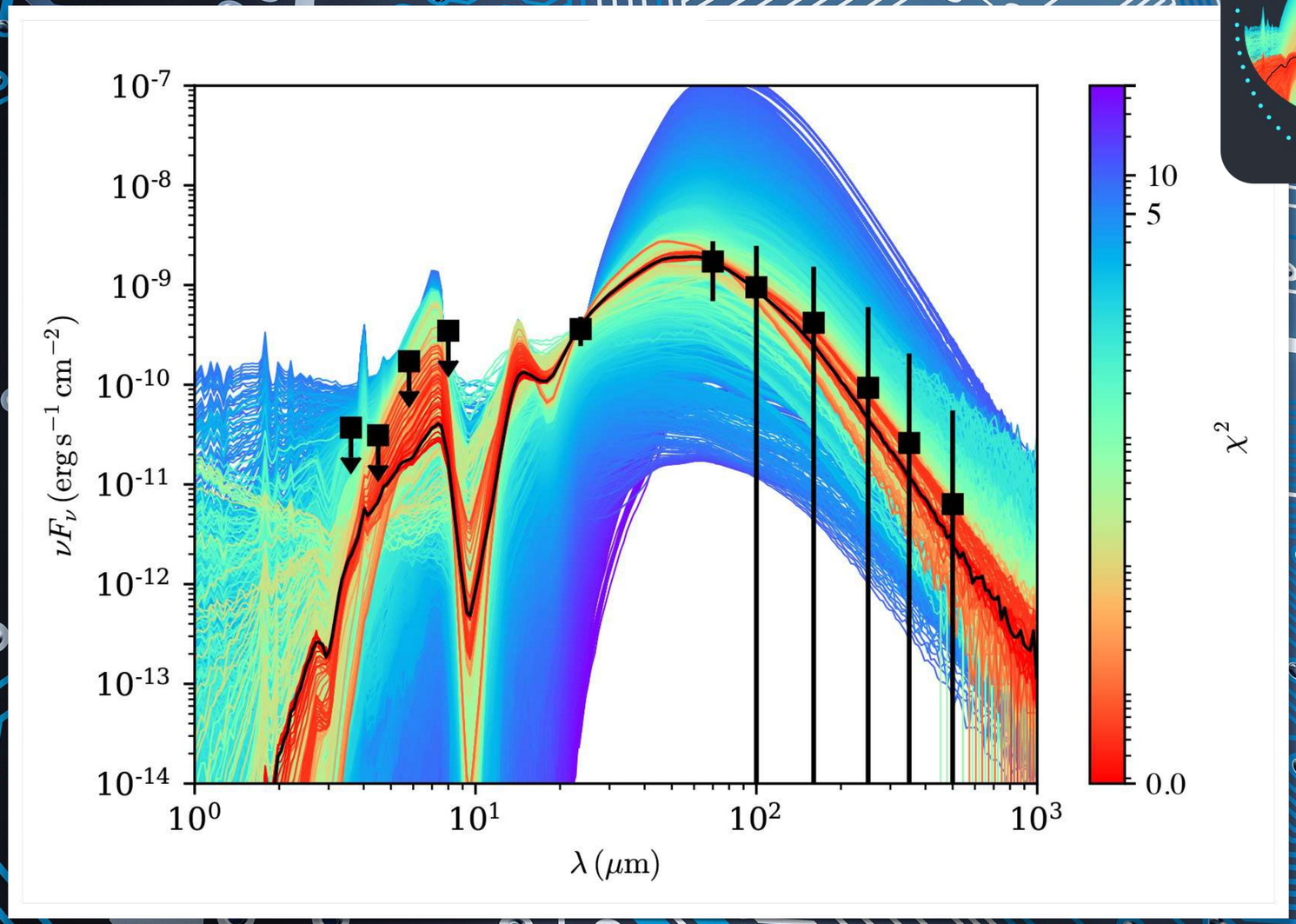
3. Filtering
4. Apertures
5. Masks
6. Regridding
7. Fluxes
8. Errors



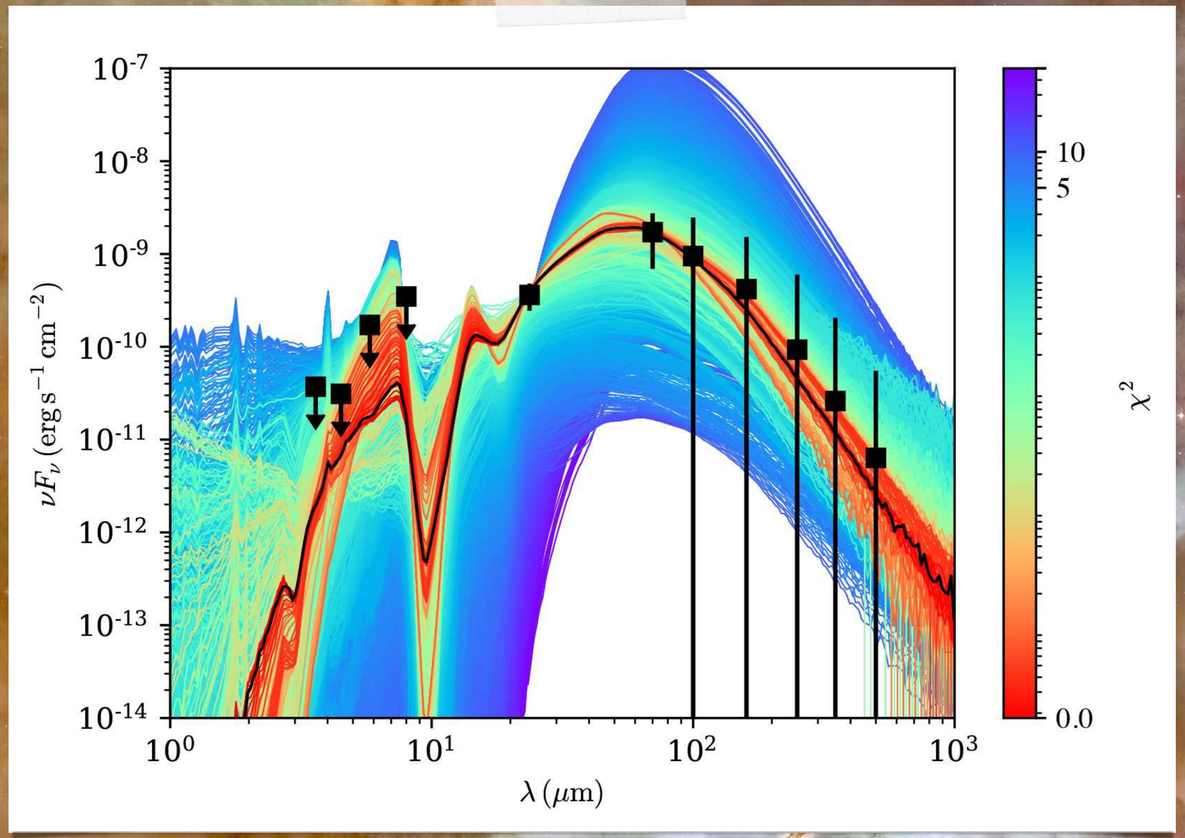
12 Steps Guide

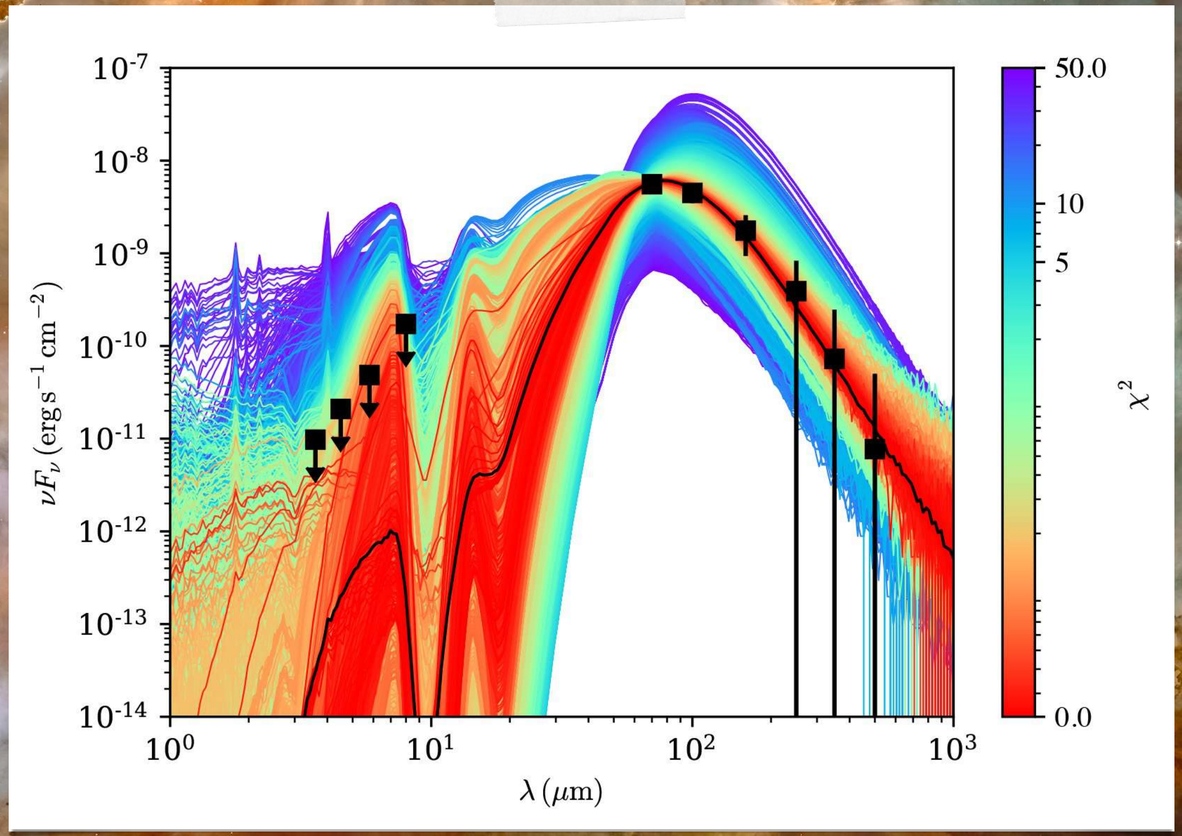
1. Images
2. Sources
3. Filtering
4. Apertures
5. Masks
6. Regridding
7. Fluxes
8. Errors
9. SEDs
10. Fitting
11. Averaging
12. Parameters

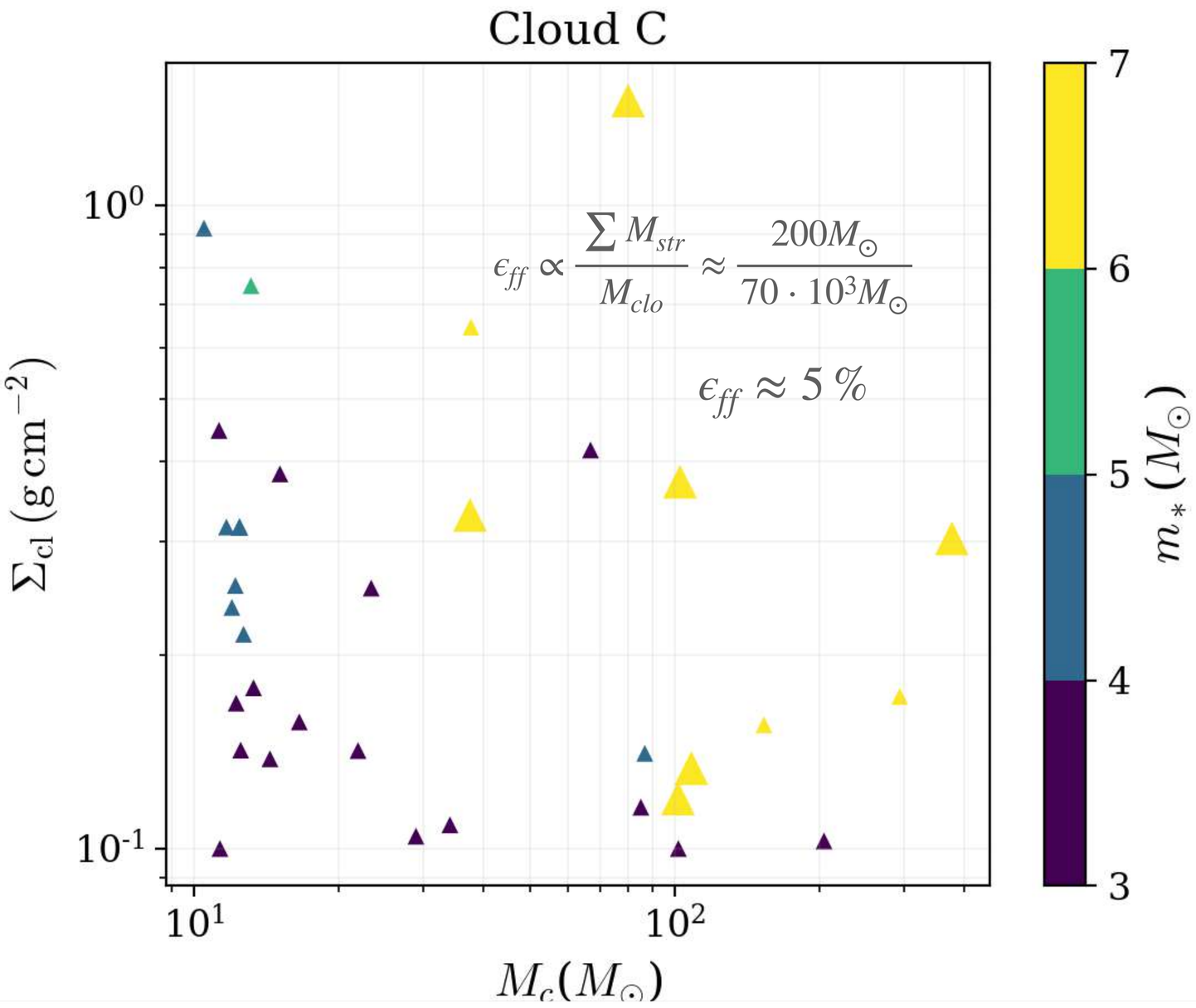


R. Fedriani et al. 2022

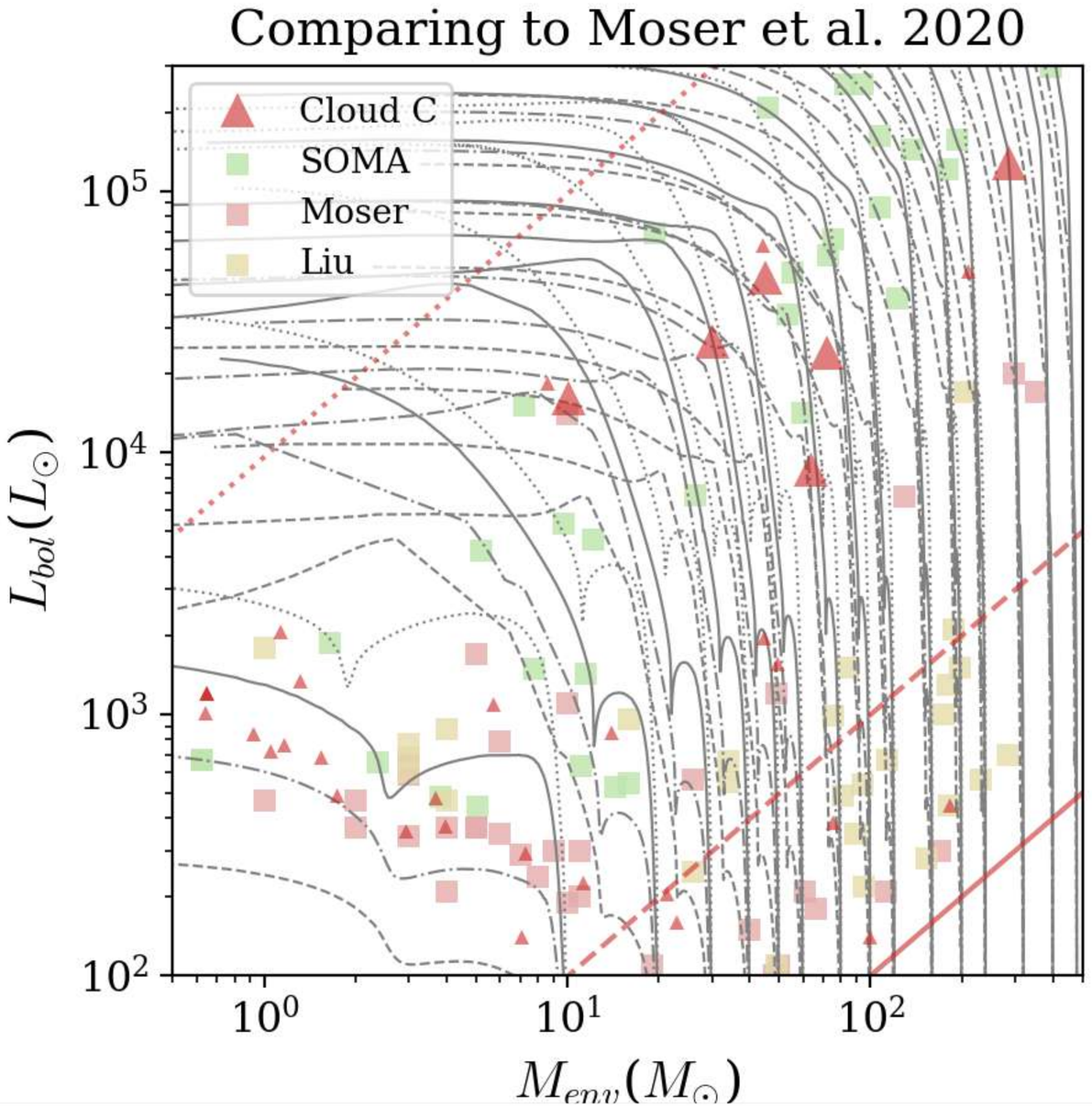
Cloud C


10^{-7}
10^{-8}
10^{-9}
10^{-10}
10^{-11}
10^{-12}
10^{-13}
10^{-14}
$\nu F_\nu\,(\mathrm{erg\,s^{-1}\,cm^{-2}})$
10^0
10^1
10^2
10^3
$\lambda\,(\mu\mathrm{m})$
10
5
0.0
χ^2

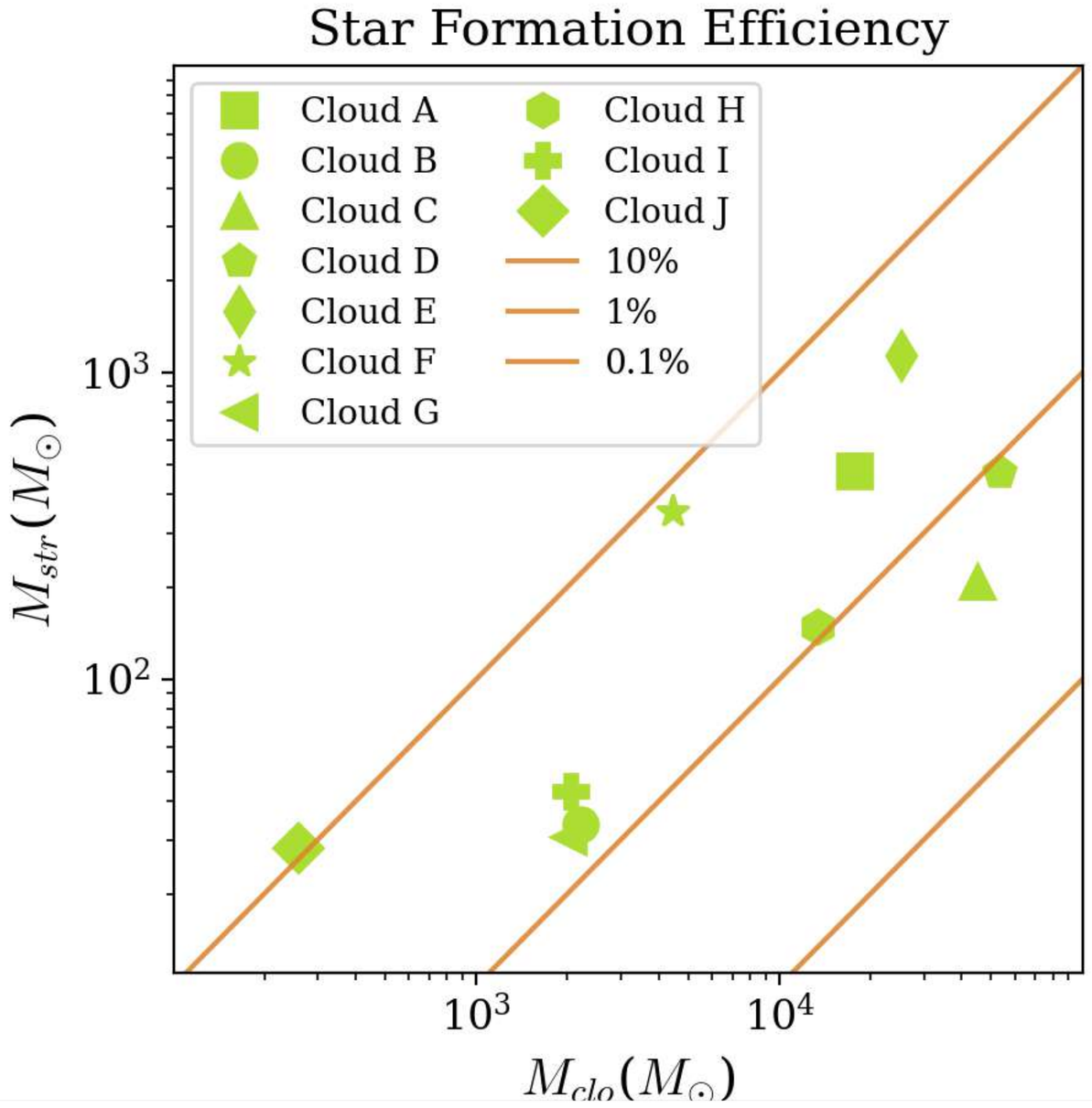

10^{-7}
10^{-8}
10^{-9}
10^{-10}
10^{-11}
10^{-12}
10^{-13}
10^{-14}
$\nu F_\nu\,(\mathrm{erg\,s^{-1}\,cm^{-2}})$
10^0
10^1
10^2
10^3
$\lambda\,(\mu\mathrm{m})$
50.0
10
5
0.0
χ^2



E. Moser et al. 2020



M. Butler et al. 2012
J. Buizer et al. 2018
M. Liu et al. 2019
M. Liu et al. 2020
E. Moser et al. 2020
R. Fedriani et al. 2022



M. Butler et al. 2012

I-LiD (Infrared-Light in the Dark)

We have systematically analyzed MIR to FIR images of IRDCs to characterize their protostellar populations based on a 70 μm source input catalogue, applying new methods of aperture determination, including in crowded regions, and SED fitting.

Significant degeneracies exist for SED-derived protostellar properties, especially for faint sources and/or sources in regions of high background emission. These degeneracies are characterized by the dispersion in “good” model SED parameters that are returned by the fitting.

Summing the protostellar masses of Cloud C, i.e., 200 $M_\odot$ in comparison to the total IRDC mass of 70,000 $M_\odot$ and accounting for incompleteness and free fall time, we estimate a star formation efficiency of ~5%.

A simple ratio between total protostellar mass and total IRDC mass yields a global star formation efficiency of ~0.5%. Among the 10 IRDCs, we see a range of SFEs via the same method from ~0.5% up to 10%.

- Improved workflow consistent with previous data
- Updated parameters for Cloud C
- New results automatically obtained for 10 IRDCs

- We expand the novel field of IRDCs’ star formation studies in the IR
- With I-LiD, IR meets IRDCs :)