

THE CMF OF MASSIVE STAR-FORMING REGIONS

Javier A. Rodón

ESO/ALMA Fellow - Santiago \Rightarrow Garching

Henrik Beuther (MPIA)

Qizhou Zhang(CfA)



A link between the CMF and the IMF

→ Key on understanding the origin of the IMF

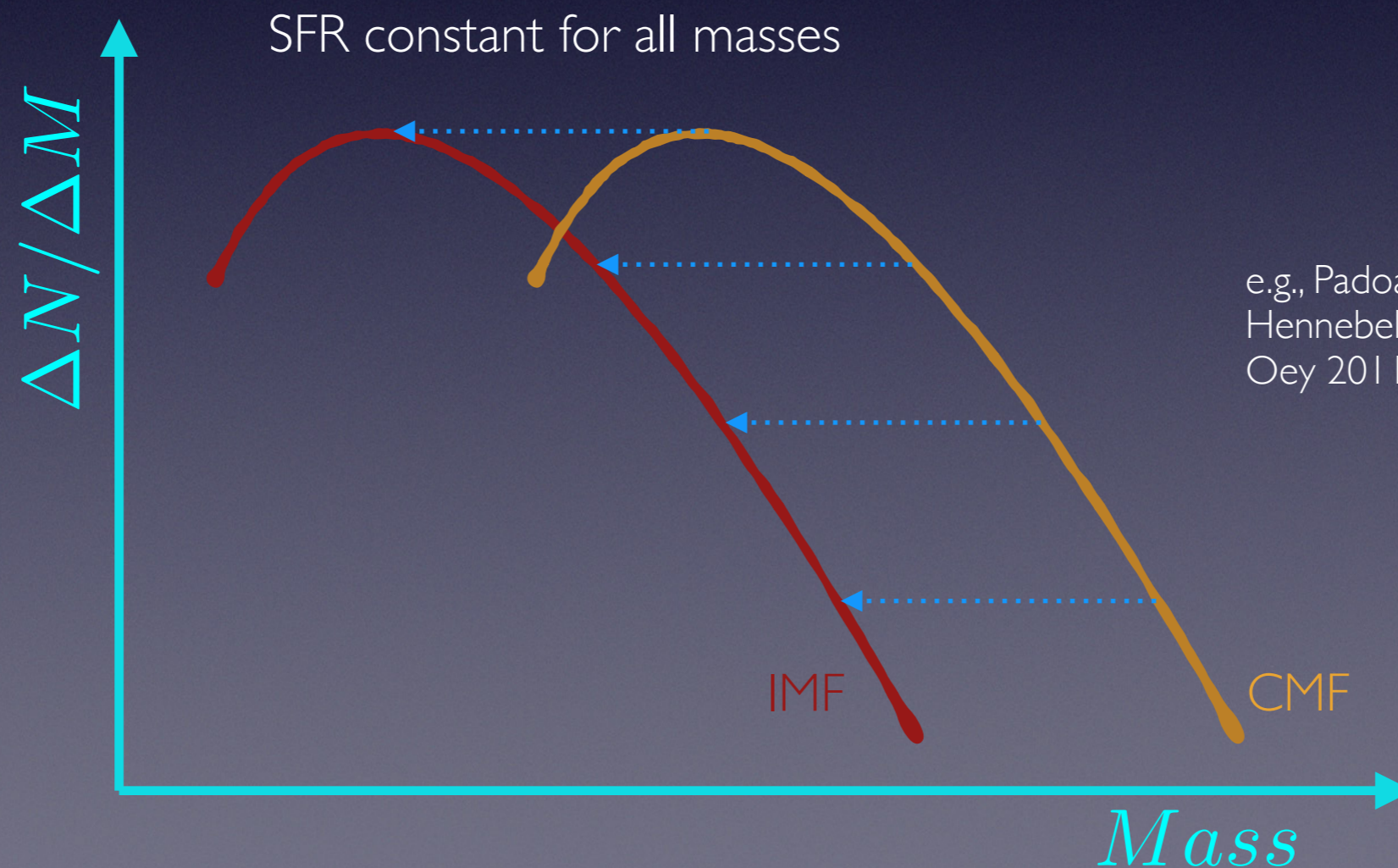
Mainly 2 theories:

A link between the CMF and the IMF

→ Key on understanding the origin of the IMF

Mainly 2 theories:

1 - The IMF is linked to the CMF



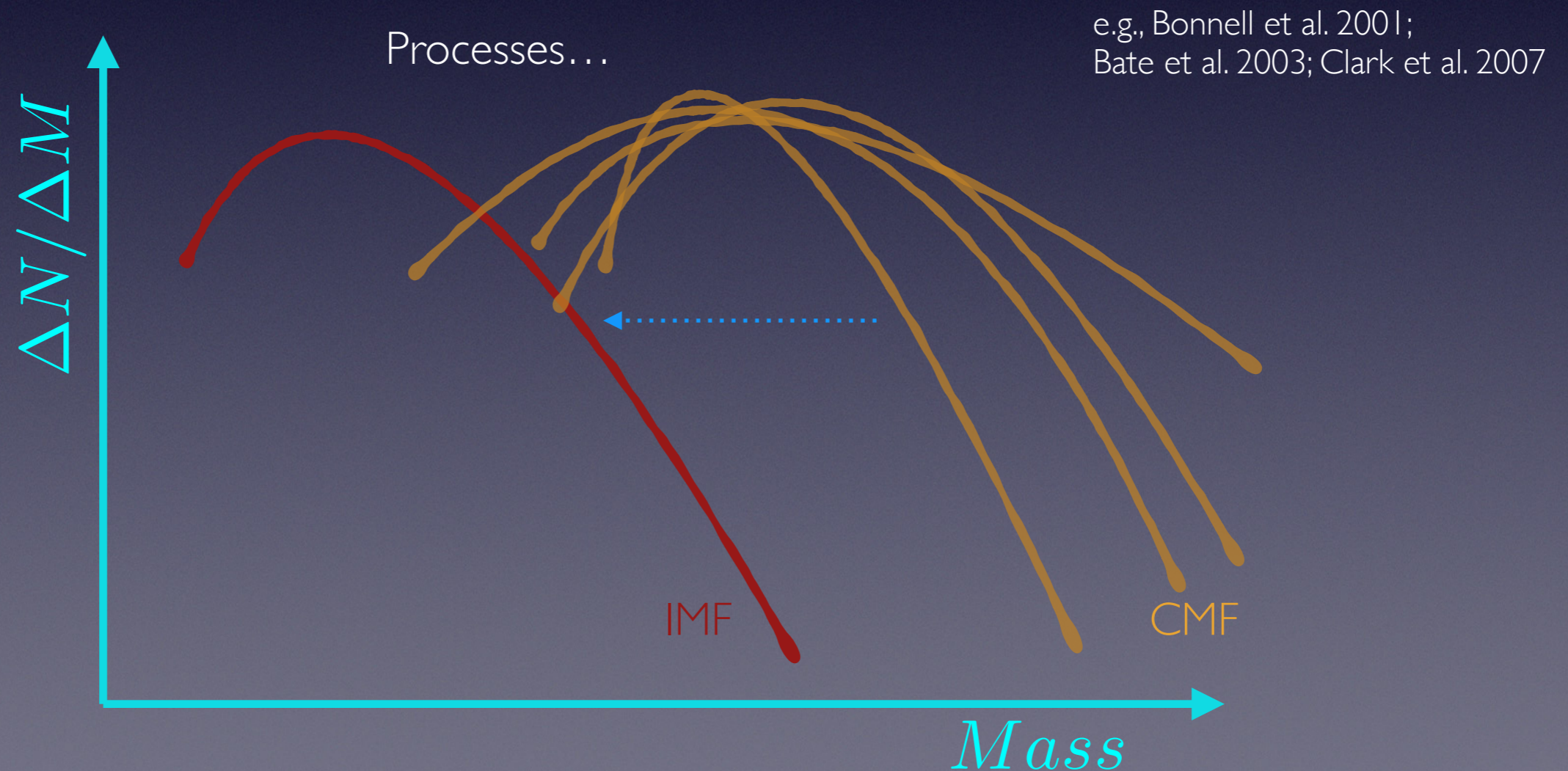
e.g., Padoan & Nordlund 2002;
Hennebelle & Chabrier 2008, 2009;
Oey 2011; Hopkins 2012

A link between the CMF and the IMF

→ Key on understanding the origin of the IMF

Mainly 2 theories:

2 - The IMF is independent of the CMF

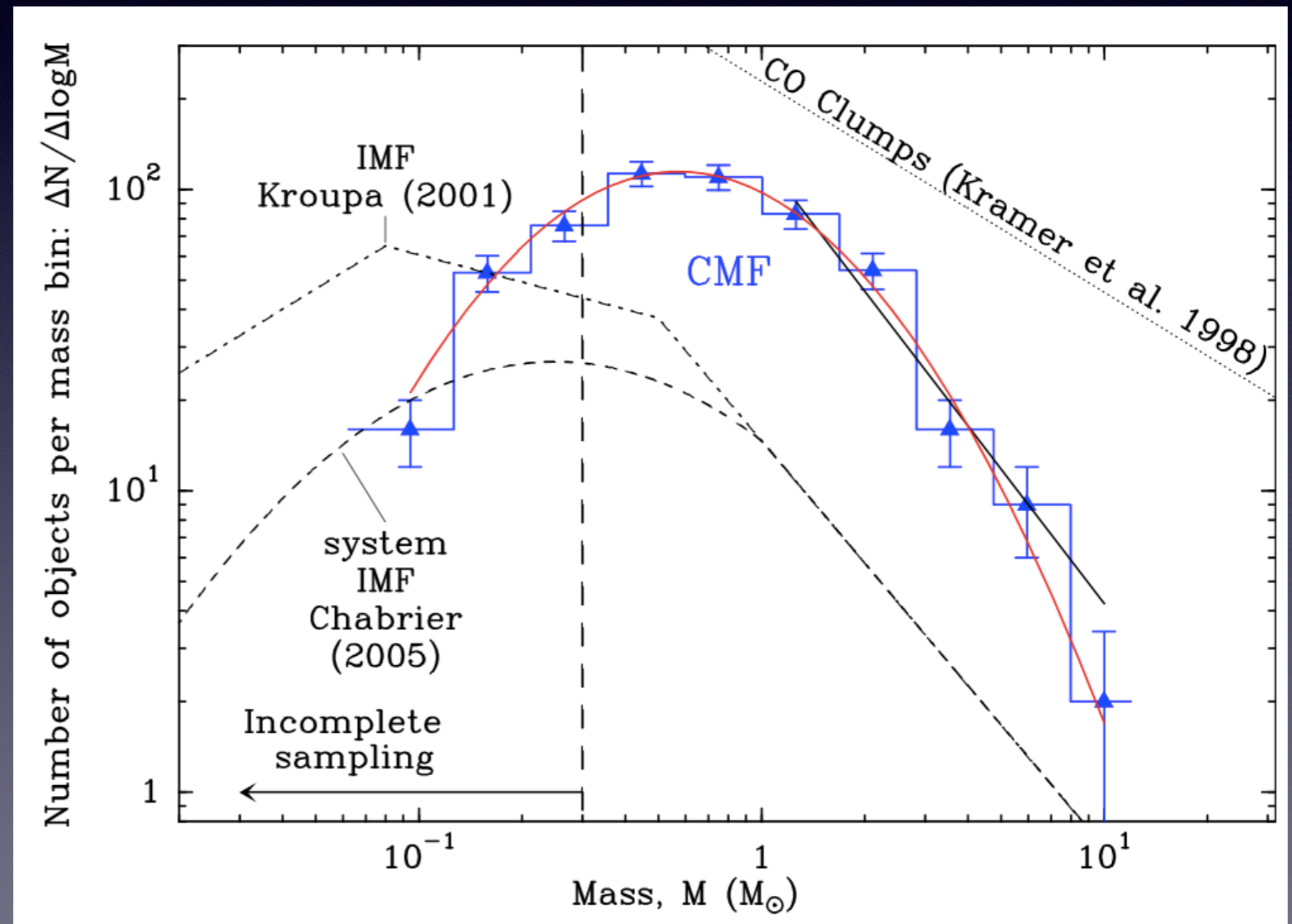


The CMF of low-mass star-forming regions

→ Observed to be similar to the IMF

Though shifted to higher masses

Aquila
(André et al. 2010)

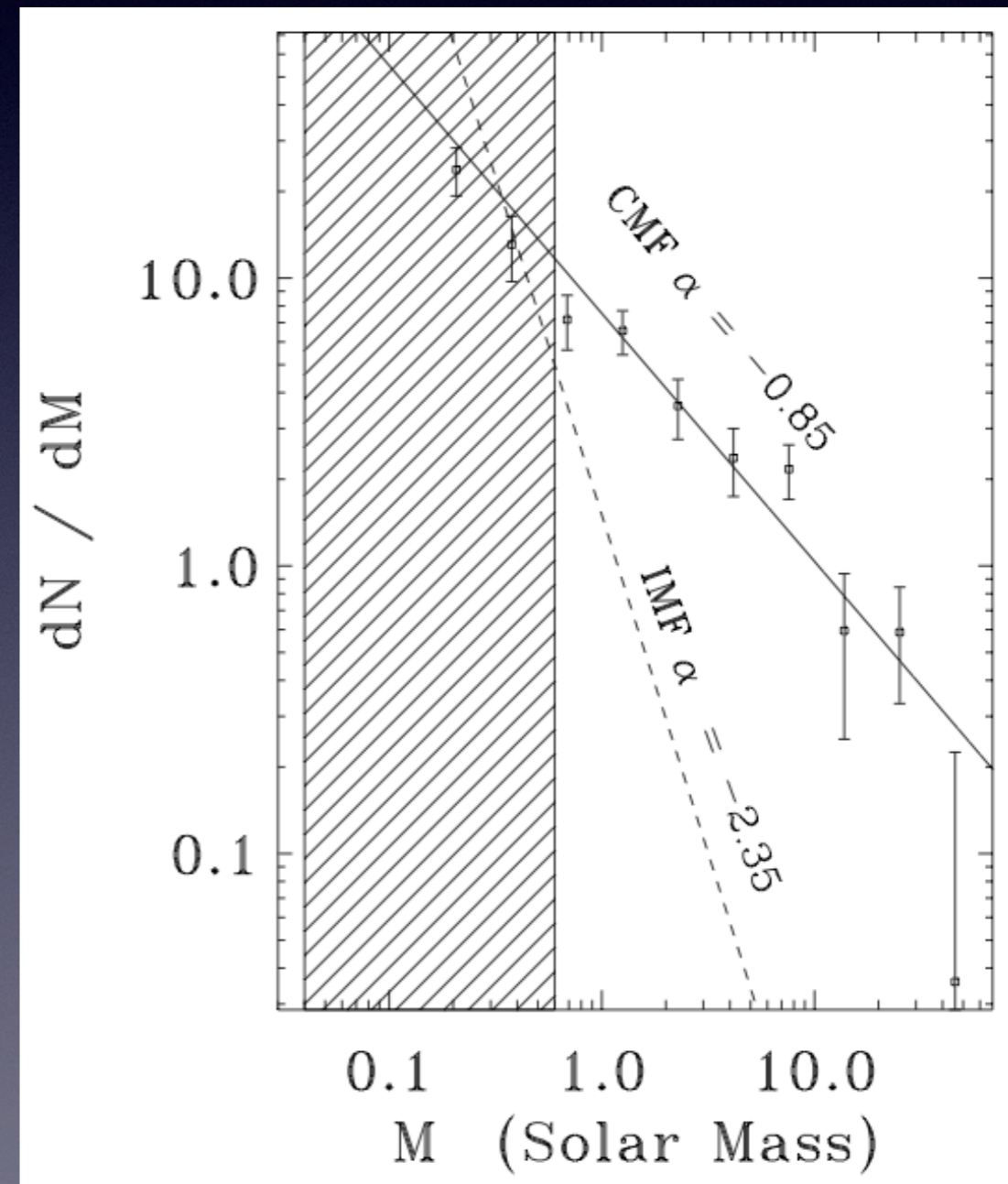


The CMF of high-mass star-forming regions

→ More rarely observed

Not always resembles the IMF

OMC
(Li et al. 2007)



Observations seem to agree with theory

→ The shape of the IMF comes from the CMF (or

Keep testing this

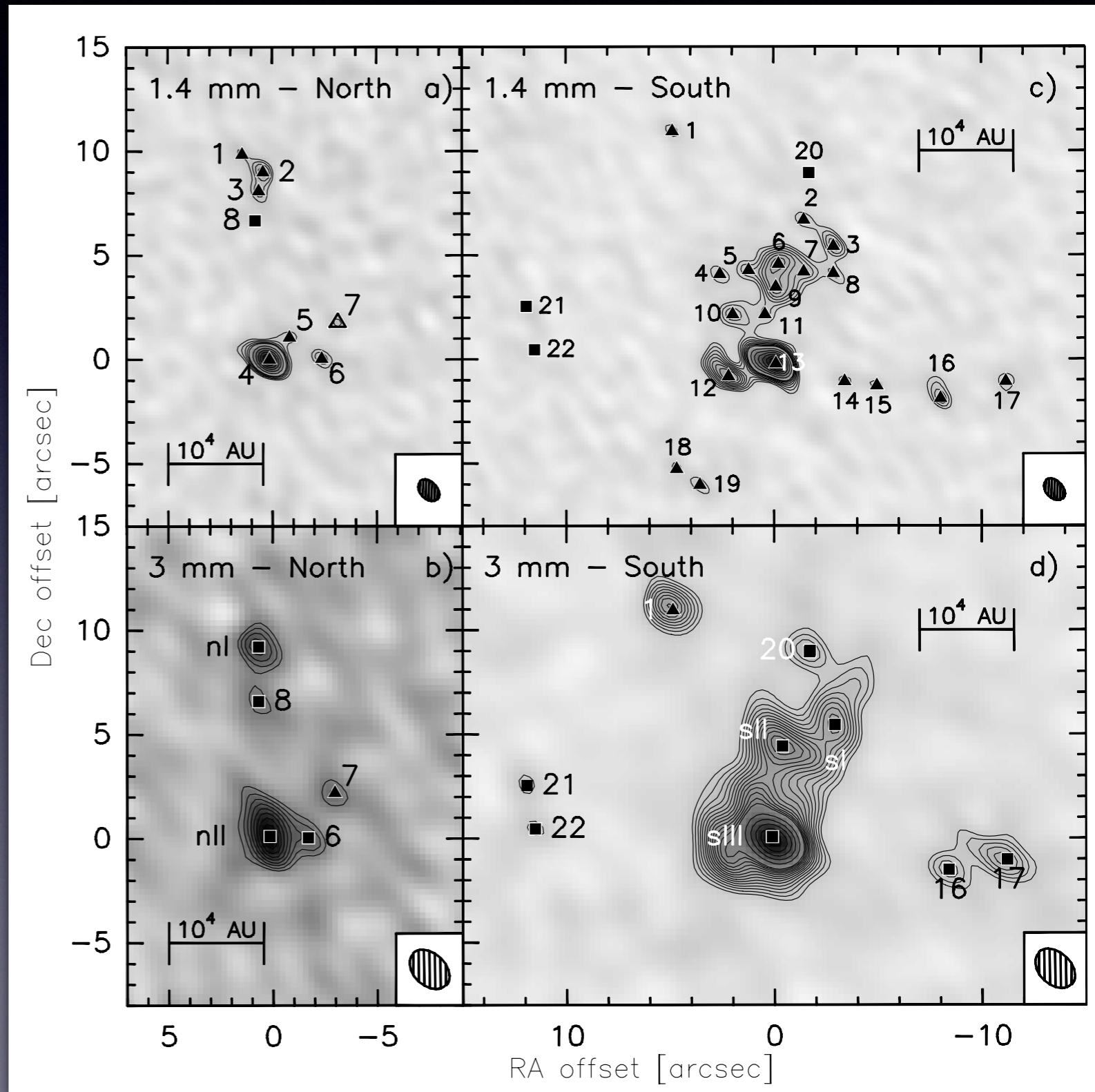
→ Increasing the sample of high-mass CMFs

Observations of high-mass star-forming regions

→ Continuum maps

IRAS 19410+2336

- PdBI data
- Two subregions
- ~ 0.01 pc resolution
- Size ~ 0.1 pc



Observations of high-mass star-forming regions

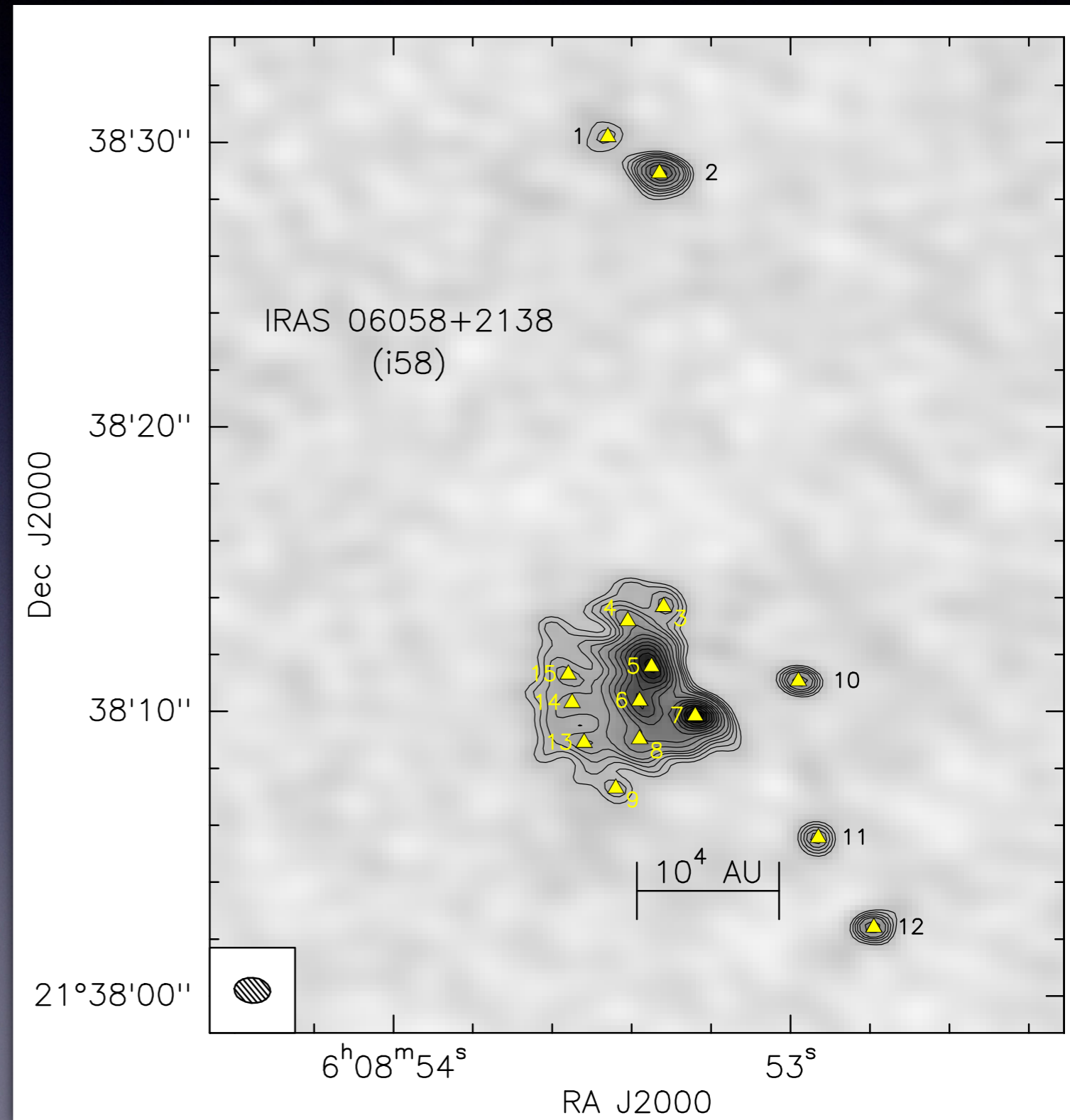
→ Continuum maps

IRAS 06058+2138

→ SMA data

→ ~ 0.01 pc resolution

→ Size ~ 0.05 pc



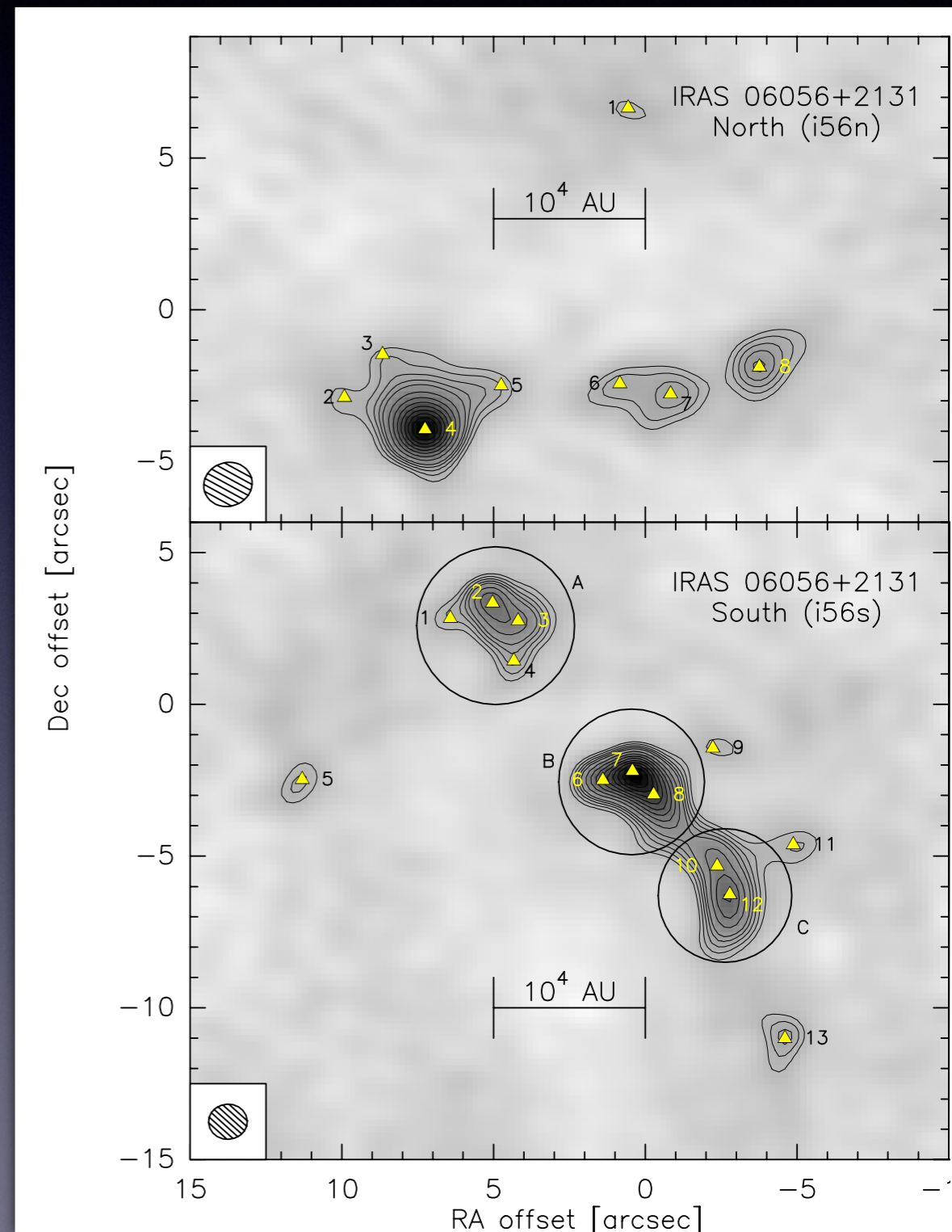
Observations of high-mass star-forming regions

→ Continuum maps

IRAS 06056+2131

- SMA data
- Two subregions
- ~ 0.01 pc resolution
- Size $\sim 0.15 - 0.25$ pc

Rodón et al. 2015 (in prep)

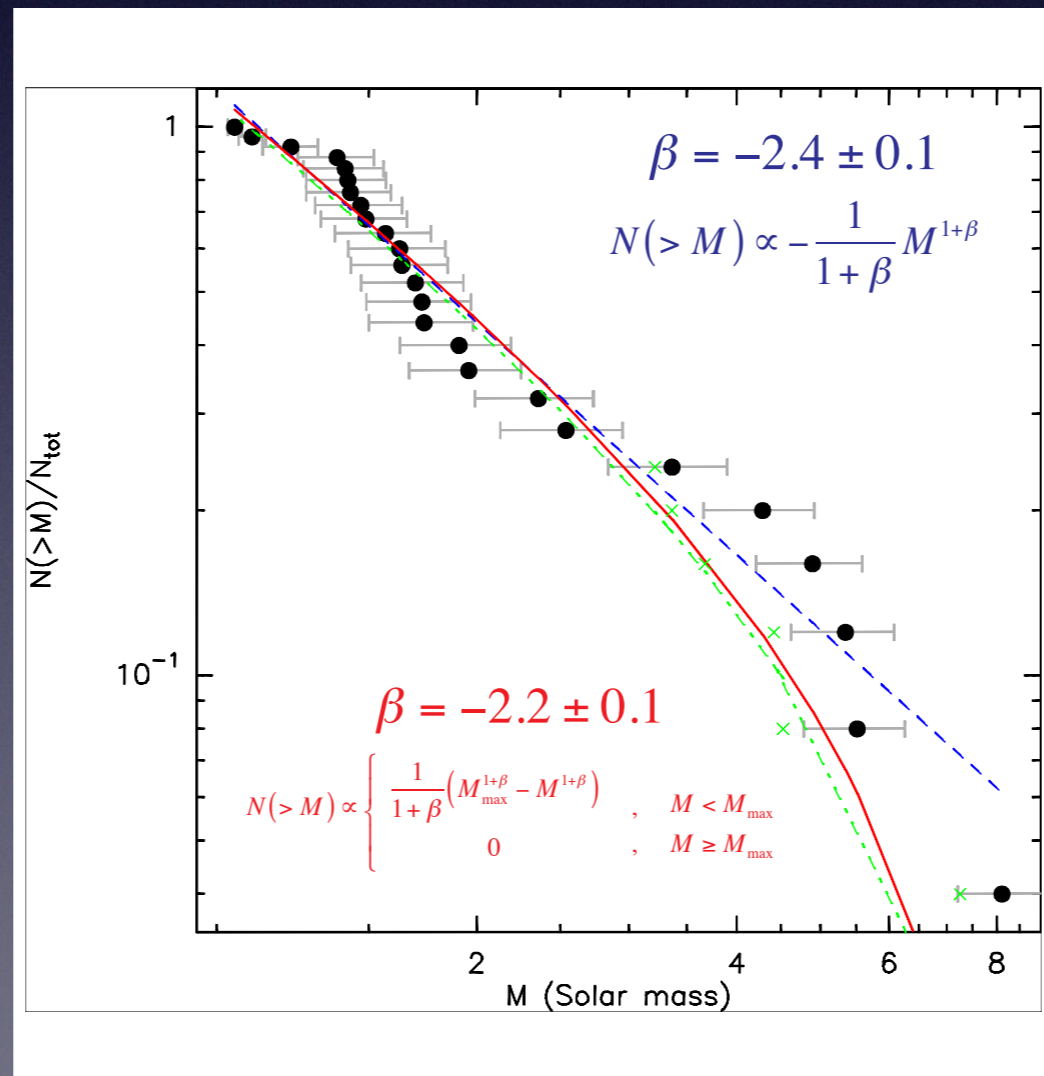


Core Mass Functions with different slopes

→ IRAS 19410+2336

CMF slope similar to Salpeter IMF

$$\beta = -2.2 \pm 0.1$$



Core Mass Functions with different slopes

→ IRAS 19410+2336

IRAS 06058+2138 ←

IRAS 06056+2131 ←

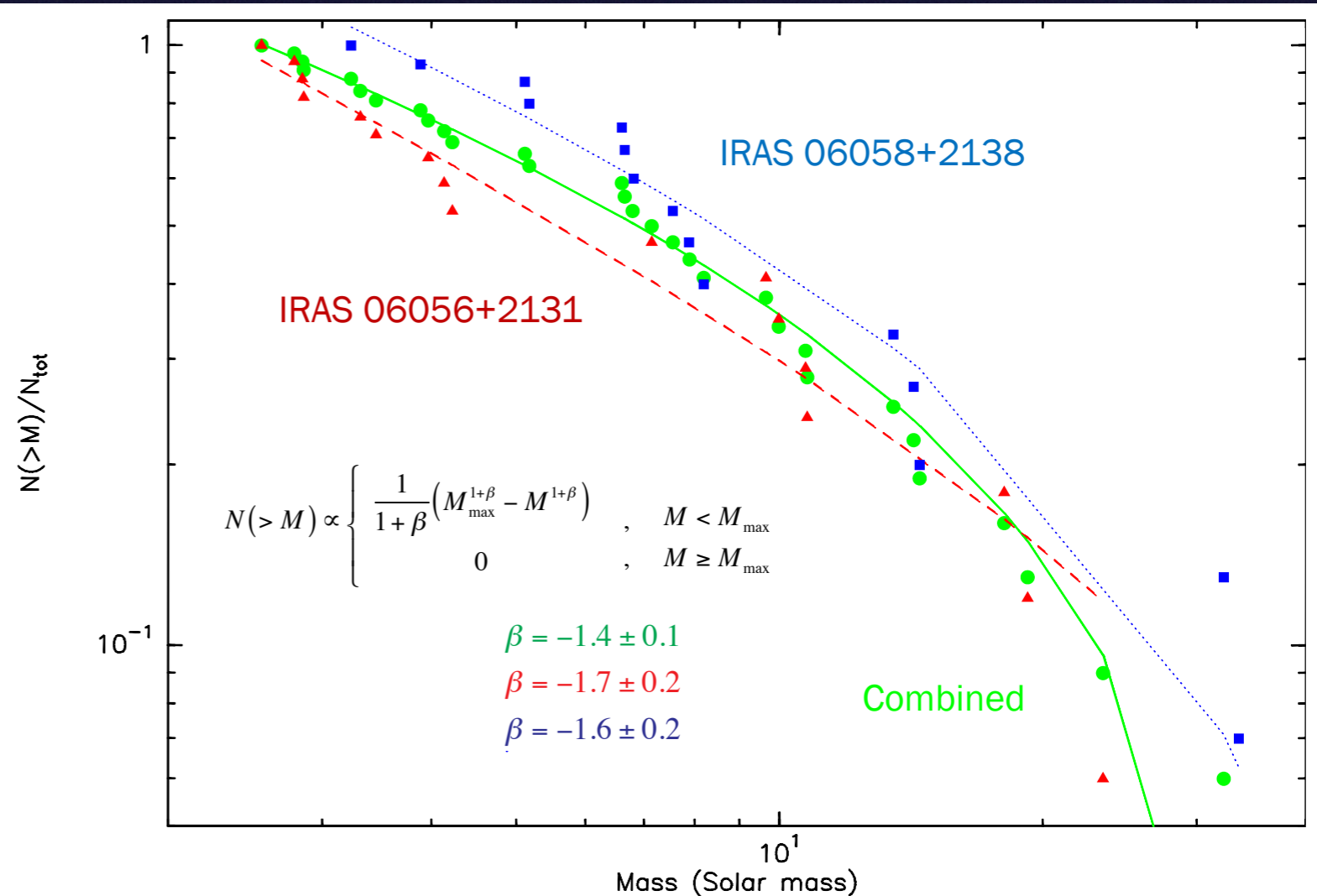
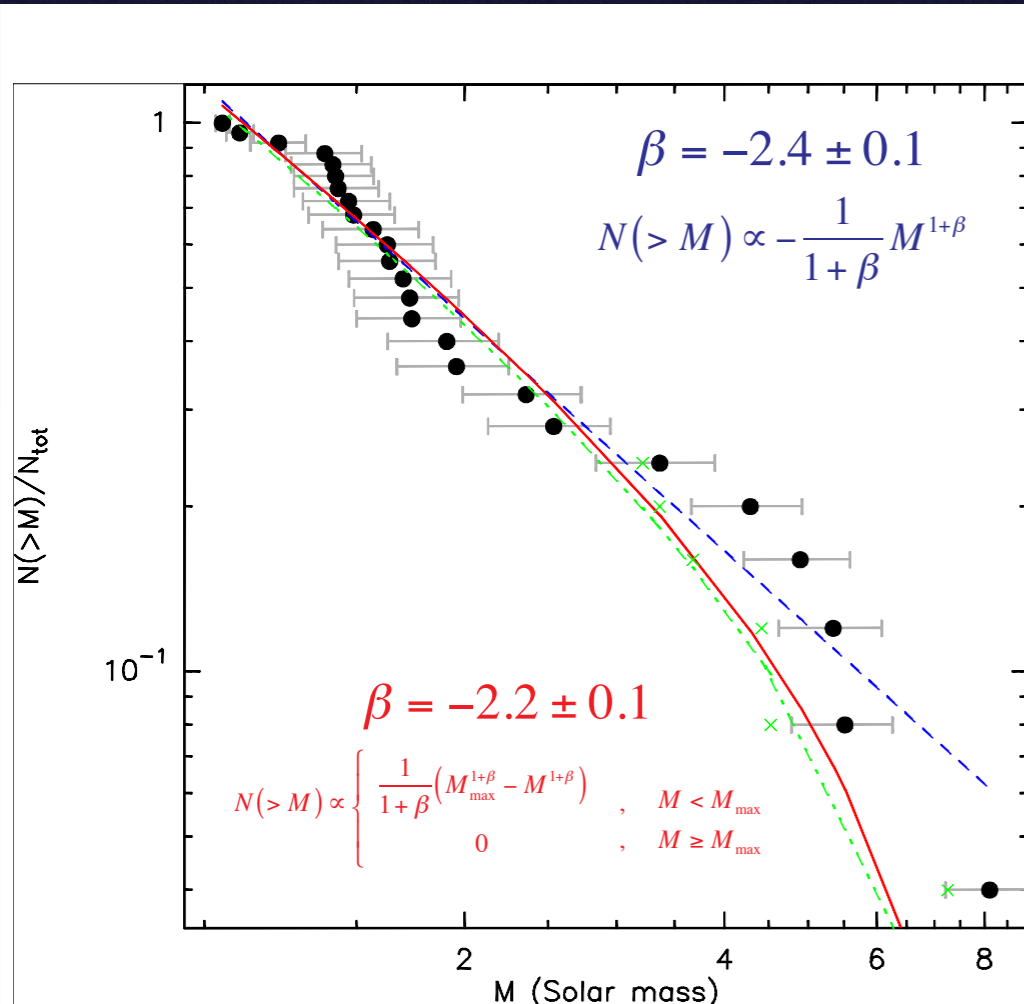
CMF slope similar to Salpeter IMF

Slopes flatter than Salpeter's IMF

$$\beta = -2.2 \pm 0.1$$

$$\beta = -1.6 \pm 0.2$$

$$\beta = -1.7 \pm 0.2$$



Why are the slopes different?

→ Completeness / confusion

Possible: Faint cores undetected

Better sensitivity / longer baselines

Why are the slopes different?

→ Completeness / confusion

Possible: Faint cores undetected

Better sensitivity / longer baselines

→ Further fragmentation

Possible: The brightest cores are fragmenting

Better resolution

Why are the slopes different?

→ Completeness / confusion

Possible: Faint cores undetected

Better sensitivity / longer baselines

→ Further fragmentation

Possible: The brightest cores are fragmenting

Better resolution

→ Different star-forming processes at play

Most likely:

Processes favoring formation of massive cores

Too early for low-mass cores

Processes preventing fragmentation

Kinematics

Polarization

Chemistry

Thanks!

Questions?