

銀河系内・星形成・系外惑星

# 系内天体の観点から

長田哲也(京大・理)

# 星の質量関数を求める

星形成領域 星団

大質量星から小質量星まで

多重度(連星) メンバーシップ

# サーベイから数多くの星団候補

数分角をカバーする撮像と分光

可変副鏡による観測

# 小質量星の星形成 ○理解

おうし座暗黒星雲など(距離140pc)

## 大質量星の重要性

重元素

UV放射

星風・アウトフロー・HII領域膨張・超新星爆発

乱流から磁場へ

加熱と冷却

# 大質量星の星形成 ×理解

大きな減光

小ささ

急速な進化

集団での形成

理論上の困難

- IR Dark Clouds  
(ISO, MSX, Spitzer)
- Hot Molecular Cores
- Hypercompact,  
Ultracompact  
HII Regions
- Compact HII Regions

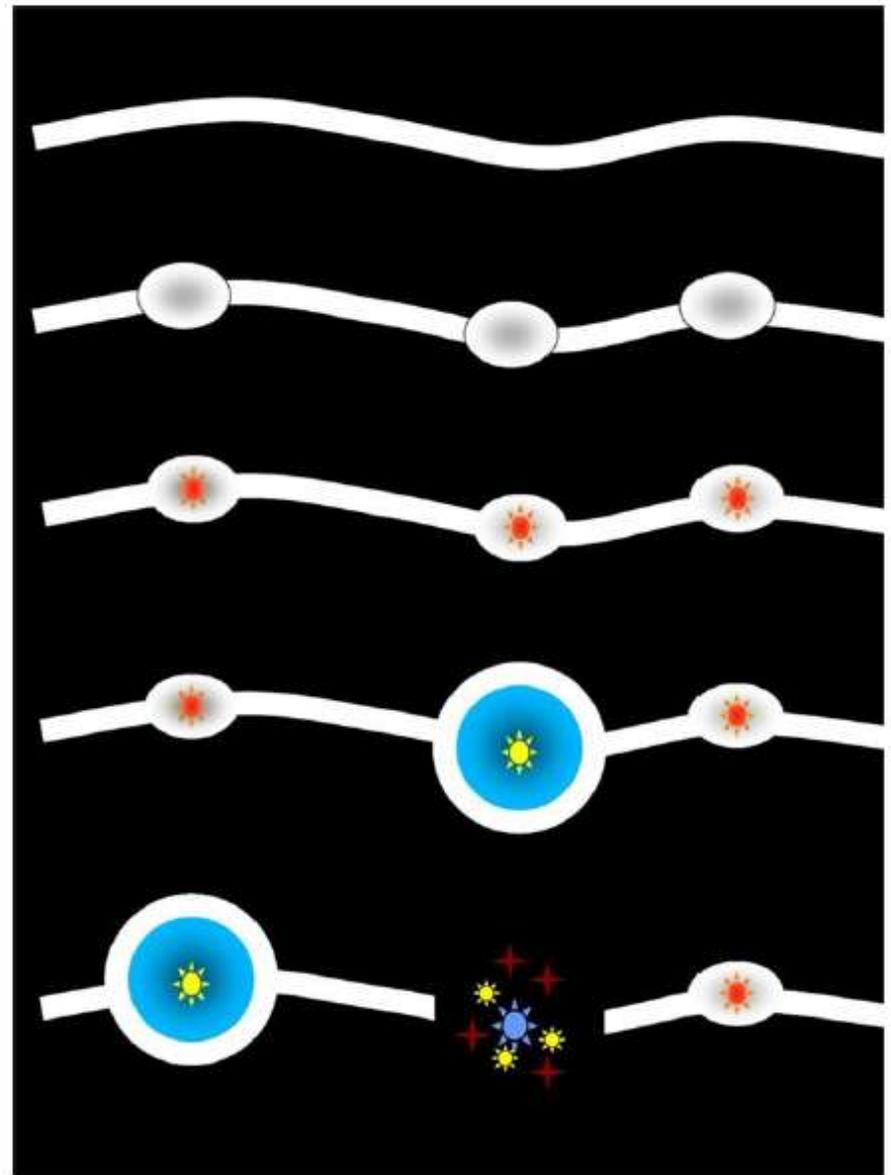
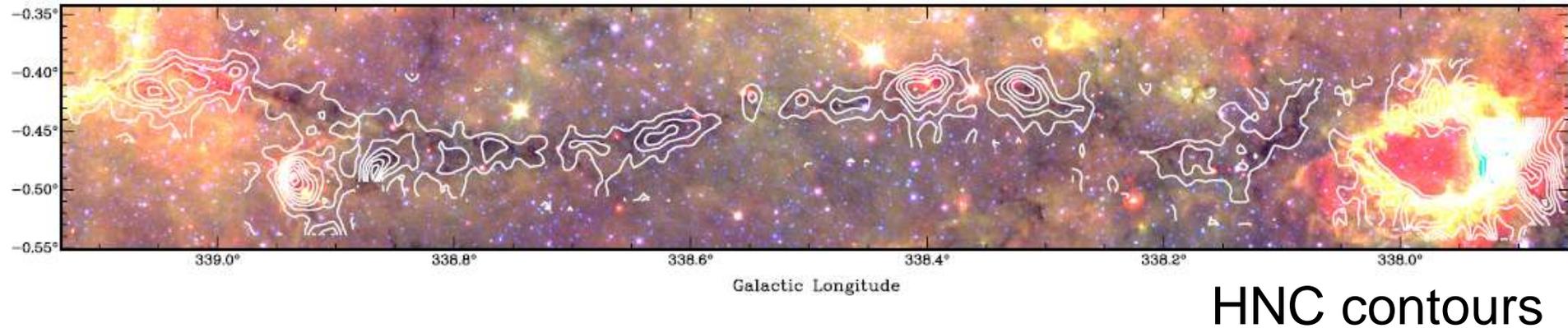
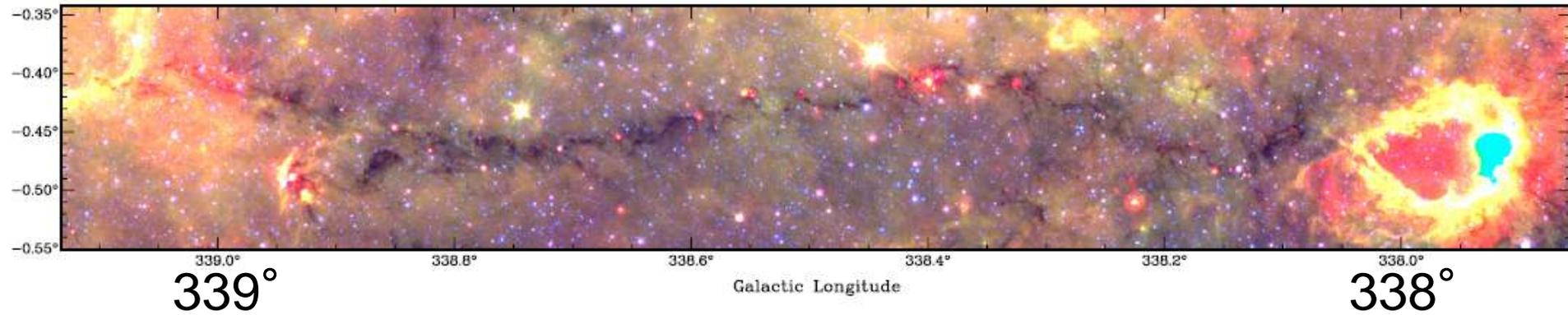


Figure 2. Hypothetical sequence of IRDC evolution. Time increases downward in the figure from top to bottom showing different evolutionary stages: a filamentary IRDC is formed, the filament fragments into dense cores, massive stars and H II regions form within these cores, and finally star clusters emerge.

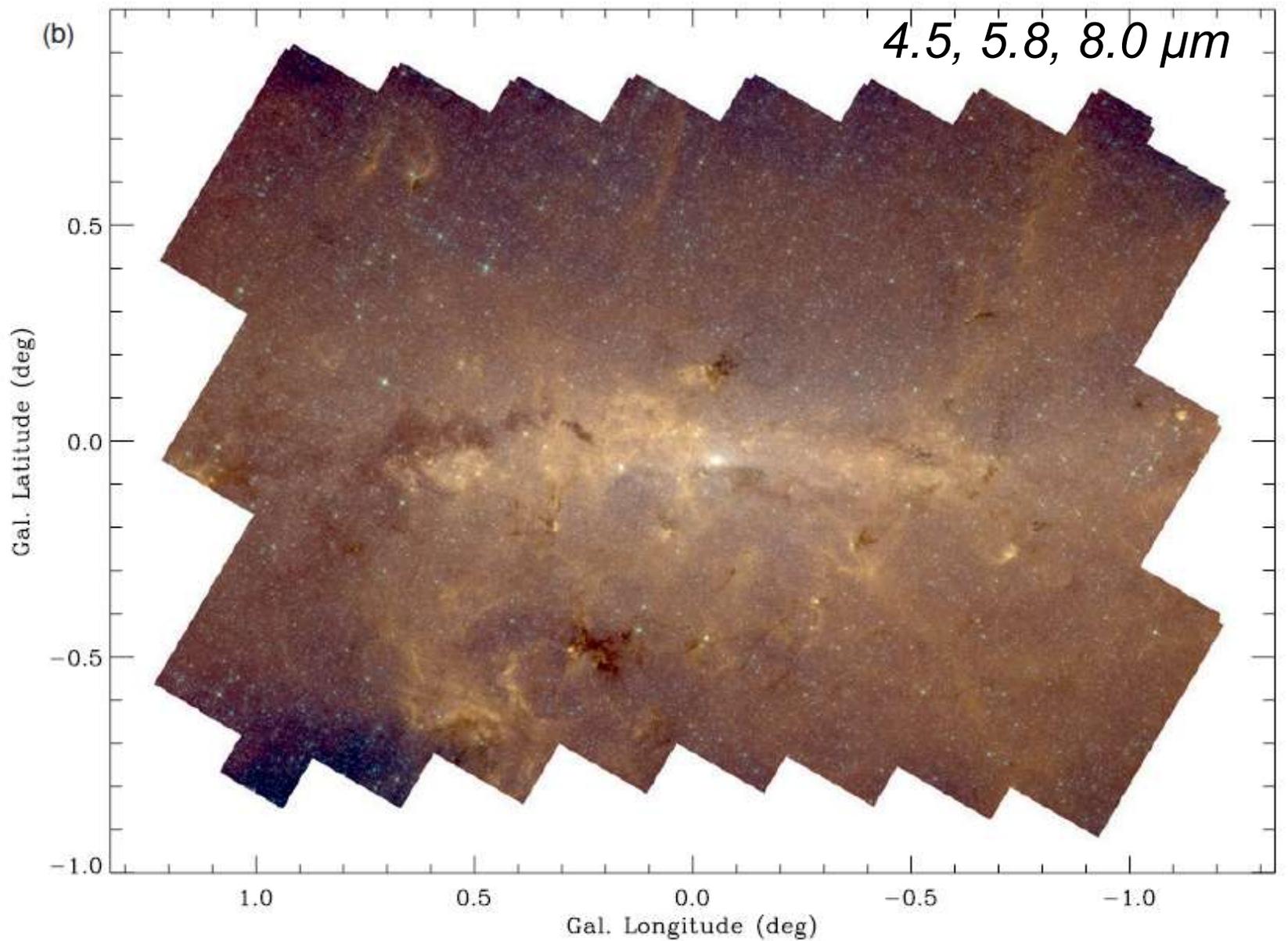
3.6, 8.0, 24  $\mu\text{m}$



HNC contours

“Nessie” IR Dark Cloud

Jackson+ 2010



IR Dark Cloud 銀河中心方向 Yusef-Zadeh+ 2009

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(ISO, MSX, Spitzer)
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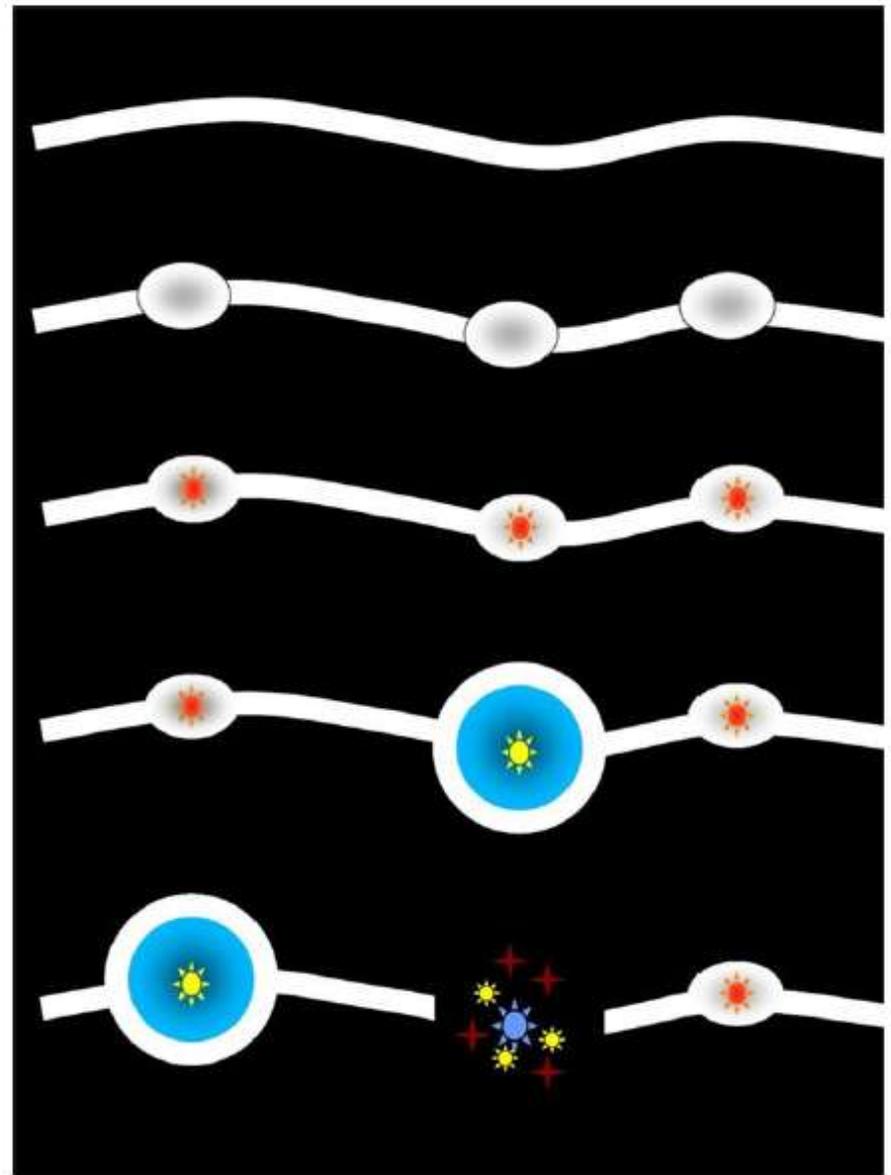
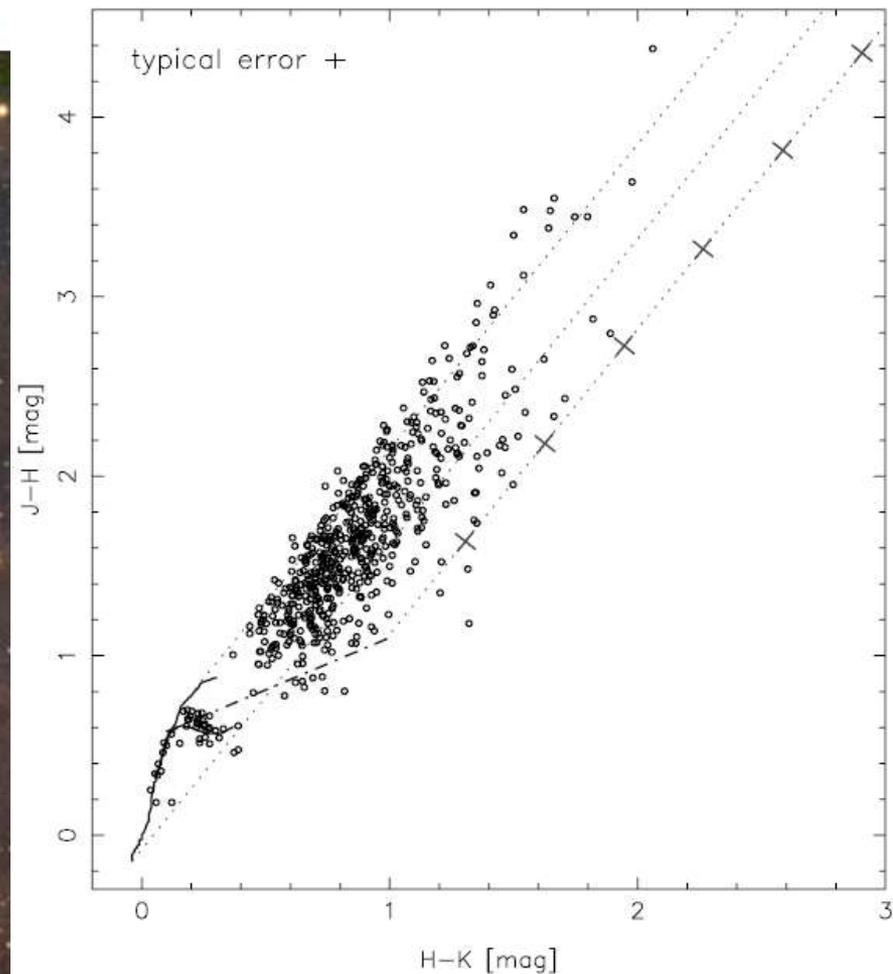
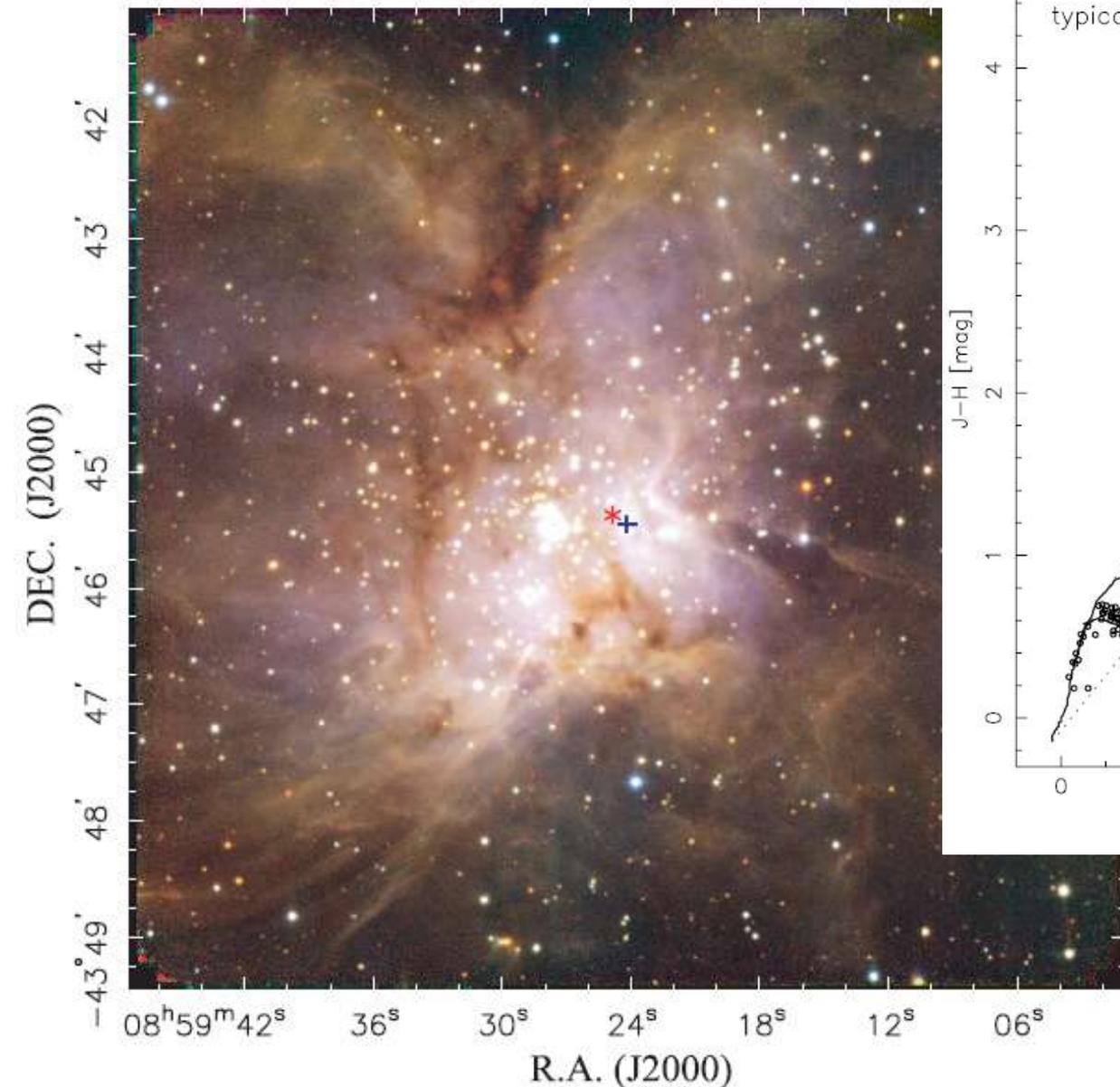


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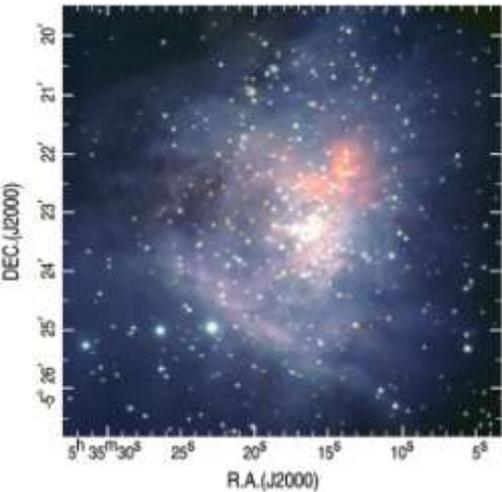
IRSF SIRIUS

 $7.7' \times 7.7'$ 

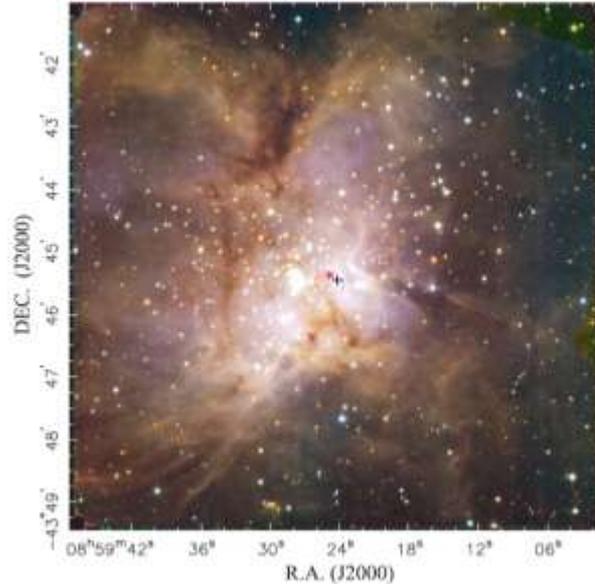
RCW36 @700pc

Baba+ 2004

1kpcで10分角 → 3pc



Orion  
@450pc



RCW36  
@700pc

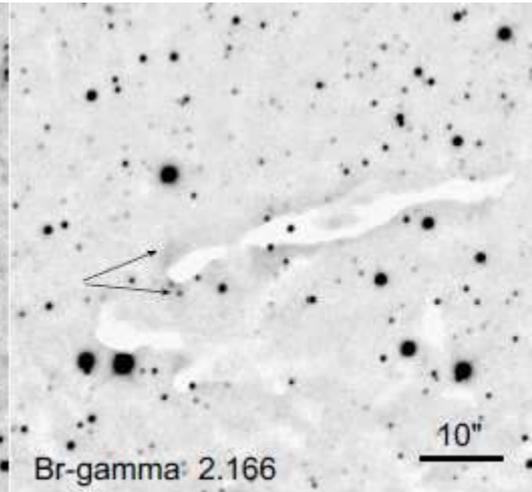
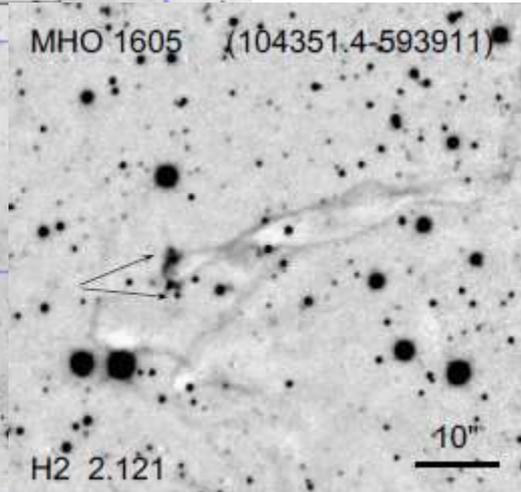
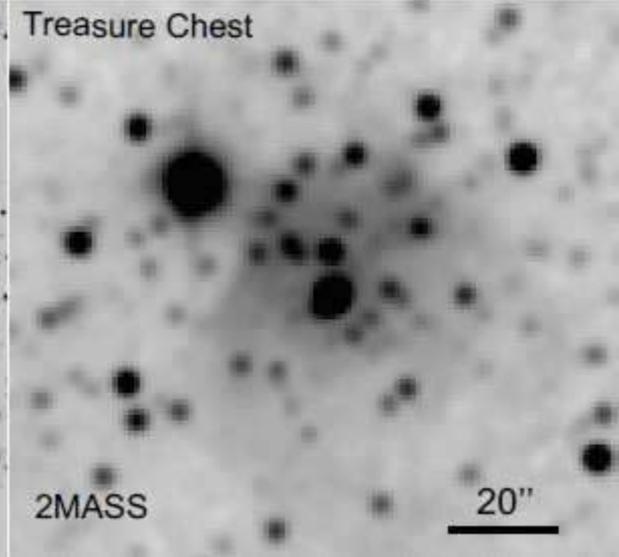
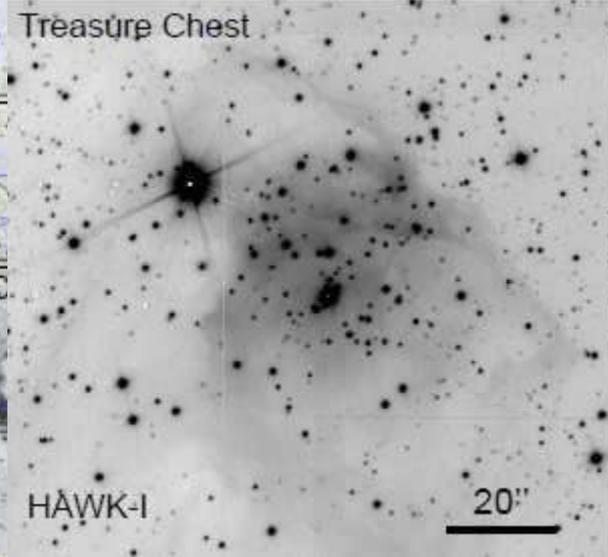
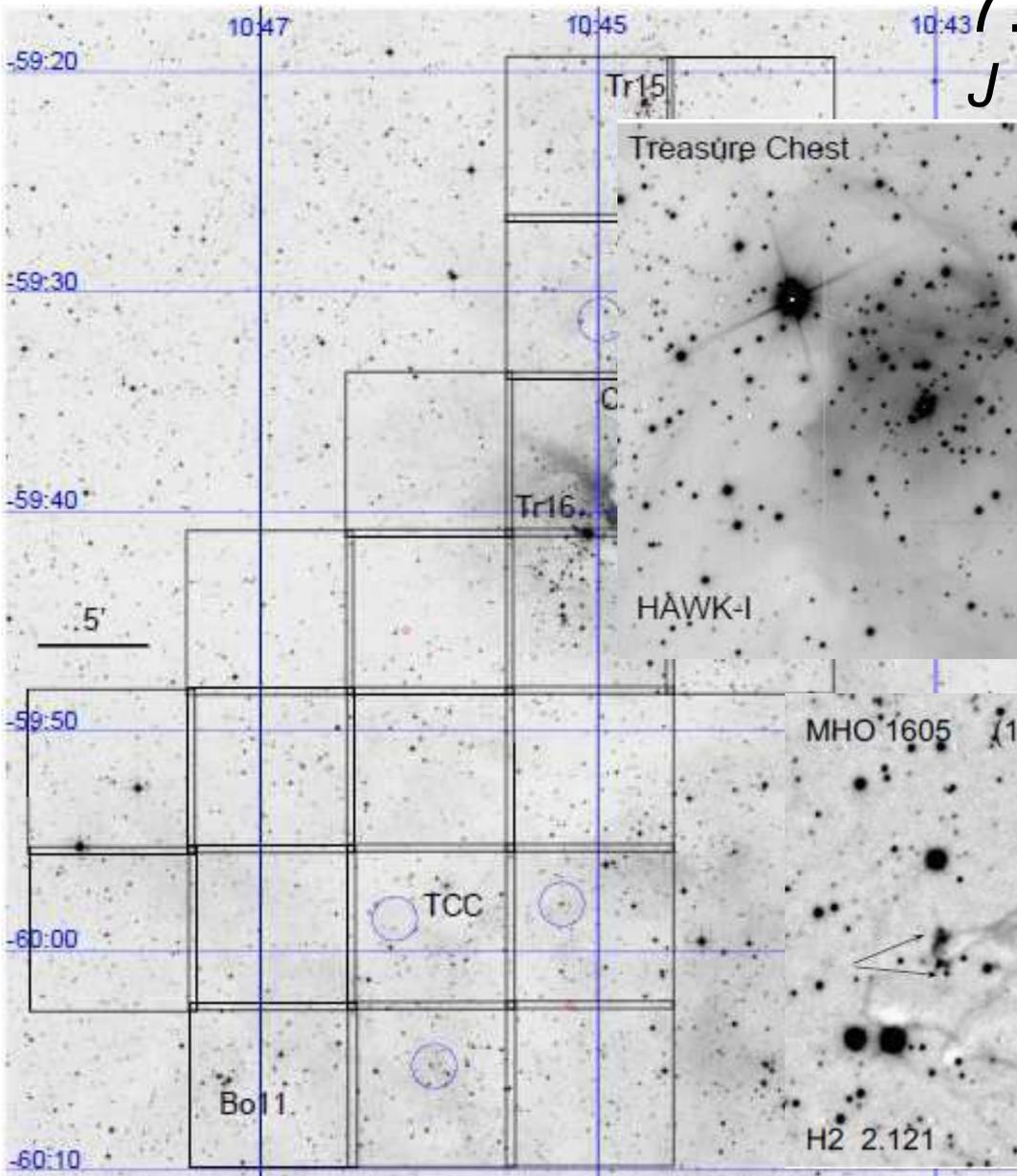


M17  
@1-2kpc

7.7' × 7.7'

7.5' × 7.5' 視野モザイク

$J \approx 23, H \approx 22, Ks \approx 21$  2.5kpc



**Carina Nebula**

VLT/HAWK-I

Preibisch+ 2011

# さまざまなサーベイ

- MSX 1173赤いソース Mottram+2010
- 2MASS 1788 星団候補 Froebrich+2007
- GLIMPSE (Spitzer)
- UKIRT, VISTA, Herschel...

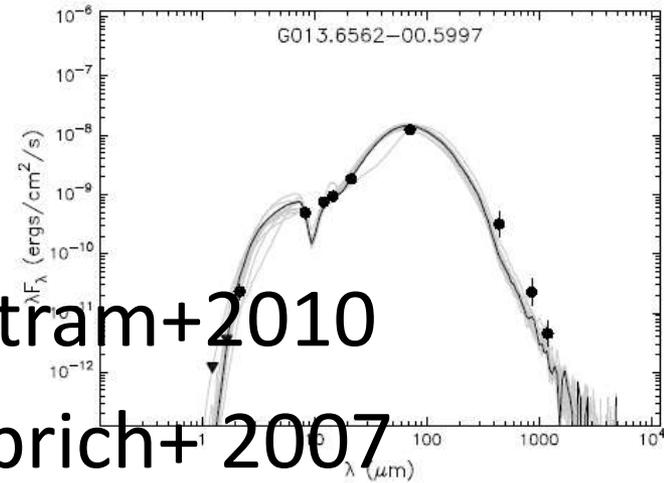
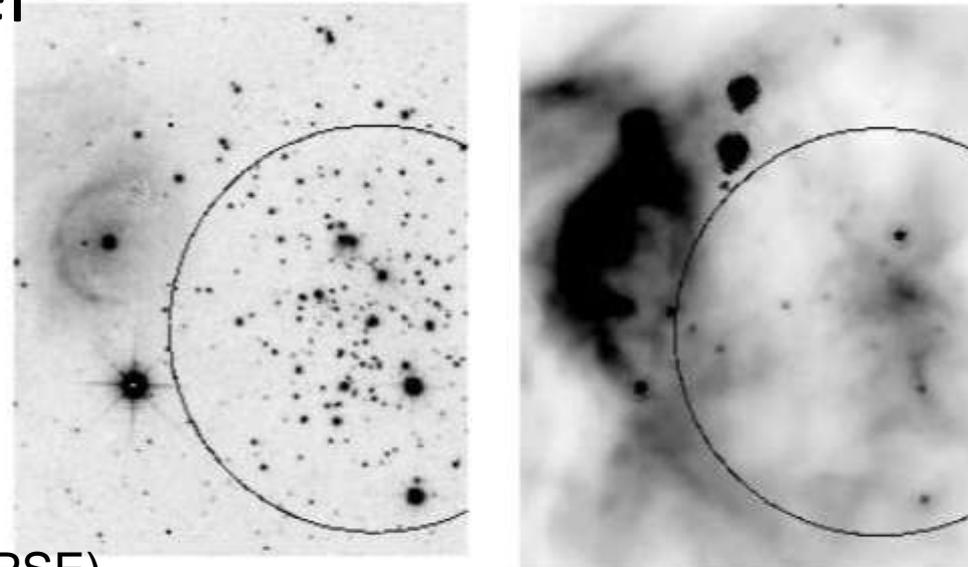


Fig. 10. Example SED (left) and greybody (right) fits to the same data. The solid line in the greybody images indicates the best two-component greybody fit.



Mercer 14 (Froebrich+2011, GRIMPSE)

Figure 3. Gray scale representation of the GPS K-band continuum (left) and the Spitzer IRAC 8  $\mu\text{m}$  image (right) of the area around Mercer 14. The large circle indicates the 'cluster area' centred on RA = 18:58:06.6 and DEC = +01:37:03 (J2000) with a radius of 0.9'. North is to the top and East to the left in the image.

# さまざまなサーベイ

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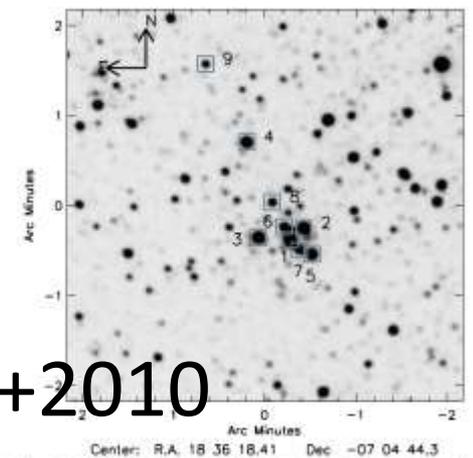
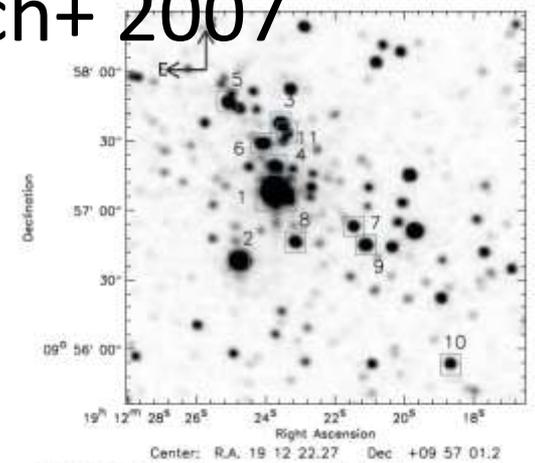
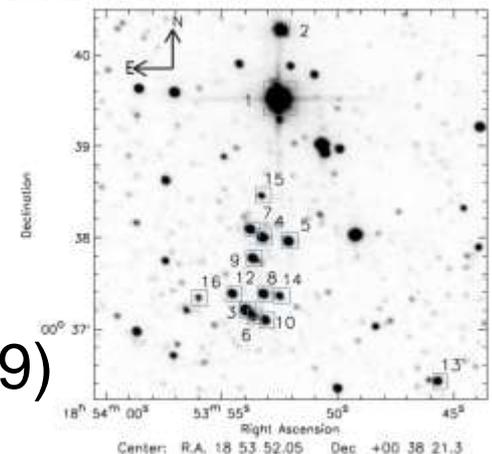


Figure 2. 2MASS K-band image of the Quislet cluster. Squares indicate the



Figure



GLIMPSE14 など (Messineo+2009)

# 星の質量関数を求める

星形成領域 星団

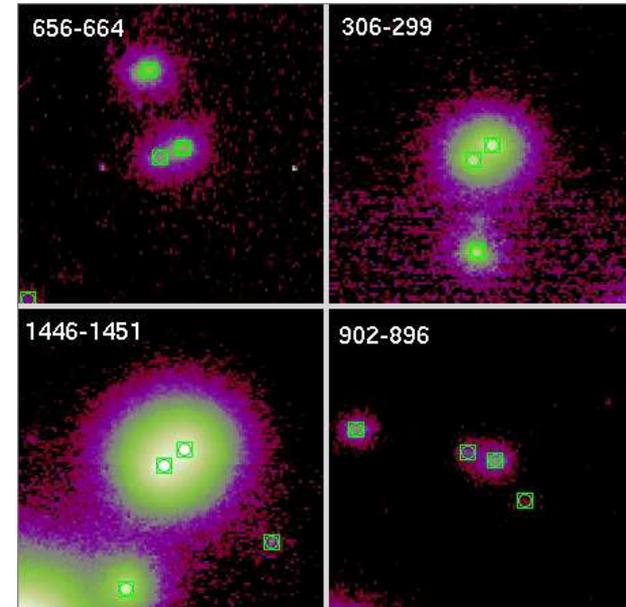
大質量星から小質量星まで

多重度(連星) メンバーシップ

Lバンド撮像も

固有運動も

Trumpler 14



6" × 6"

0.3"程度の離角

MAD

Sana+ 2010

# サーベイから数多くの星団候補

数分角をカバーする撮像と分光

可変副鏡による観測

数十?

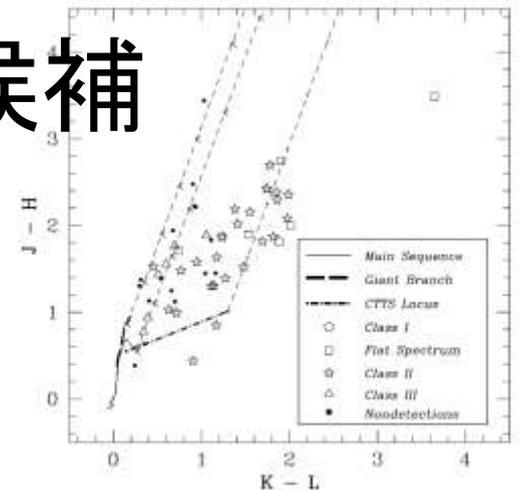


FIG. 7.—*JHKL* color-color diagram for all sources in our 10  $\mu$ m survey (NGC 2023). The sources that have *K*-band magnitudes brighter than our 10  $\mu$ m limit are plotted as open symbols. The nondetections are plotted as filled symbols.