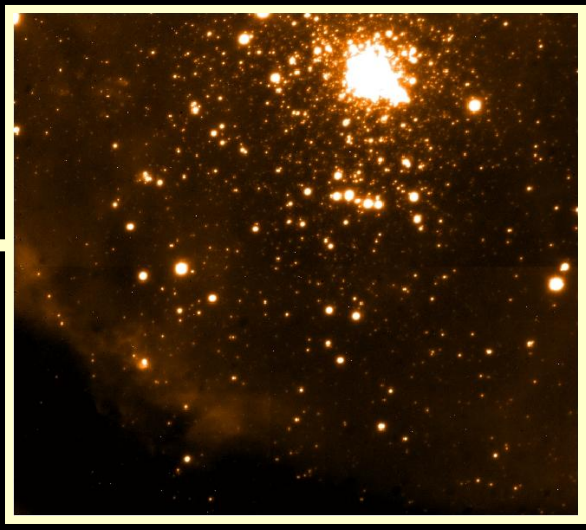
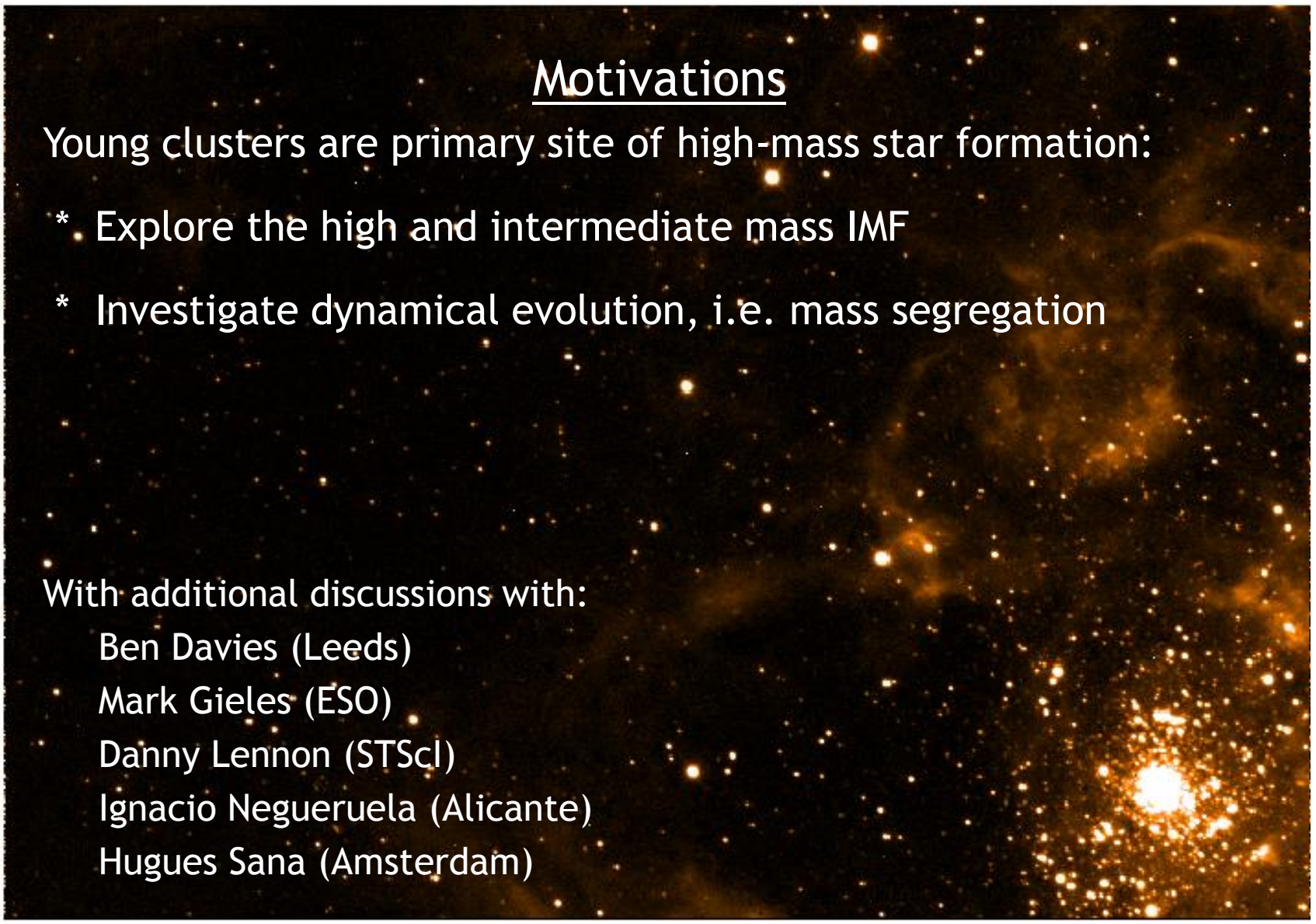


Massive Clusters in the Milky Way & the Magellanic Clouds

Chris Evans (UK ATC)
& Simon Clark (Open University)

Science & Technology Facilities Council
UK Astronomy Technology Centre

Massive Clusters: Beyond the Galactic Centre



Motivations

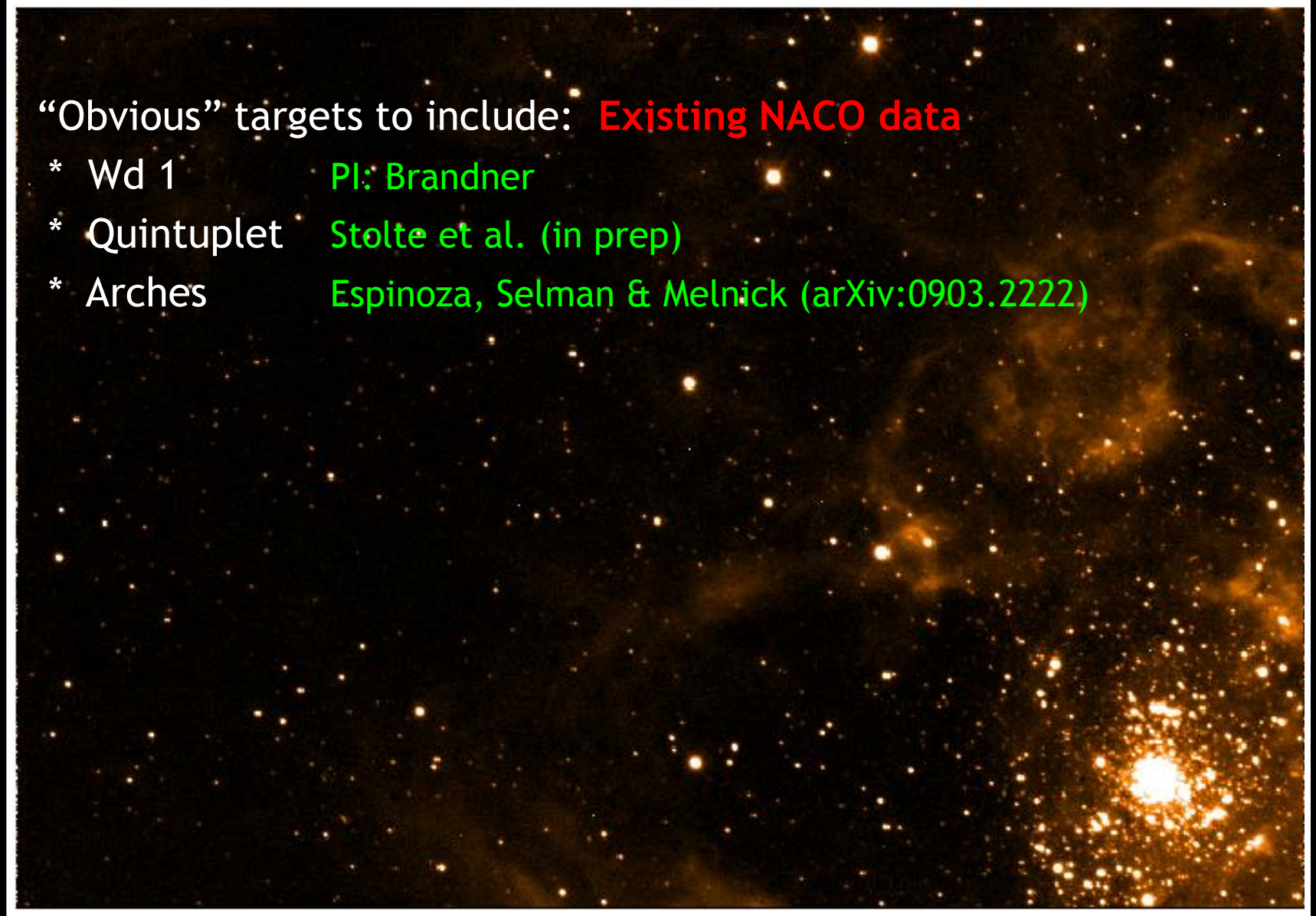
Young clusters are primary site of high-mass star formation:

* Explore the high and intermediate mass IMF
* Investigate dynamical evolution, i.e. mass segregation

With additional discussions with:

Ben Davies (Leeds)
Mark Gieles (ESO)
Danny Lennon (STScI)
Ignacio Negueruela (Alicante)
Hugues Sana (Amsterdam)

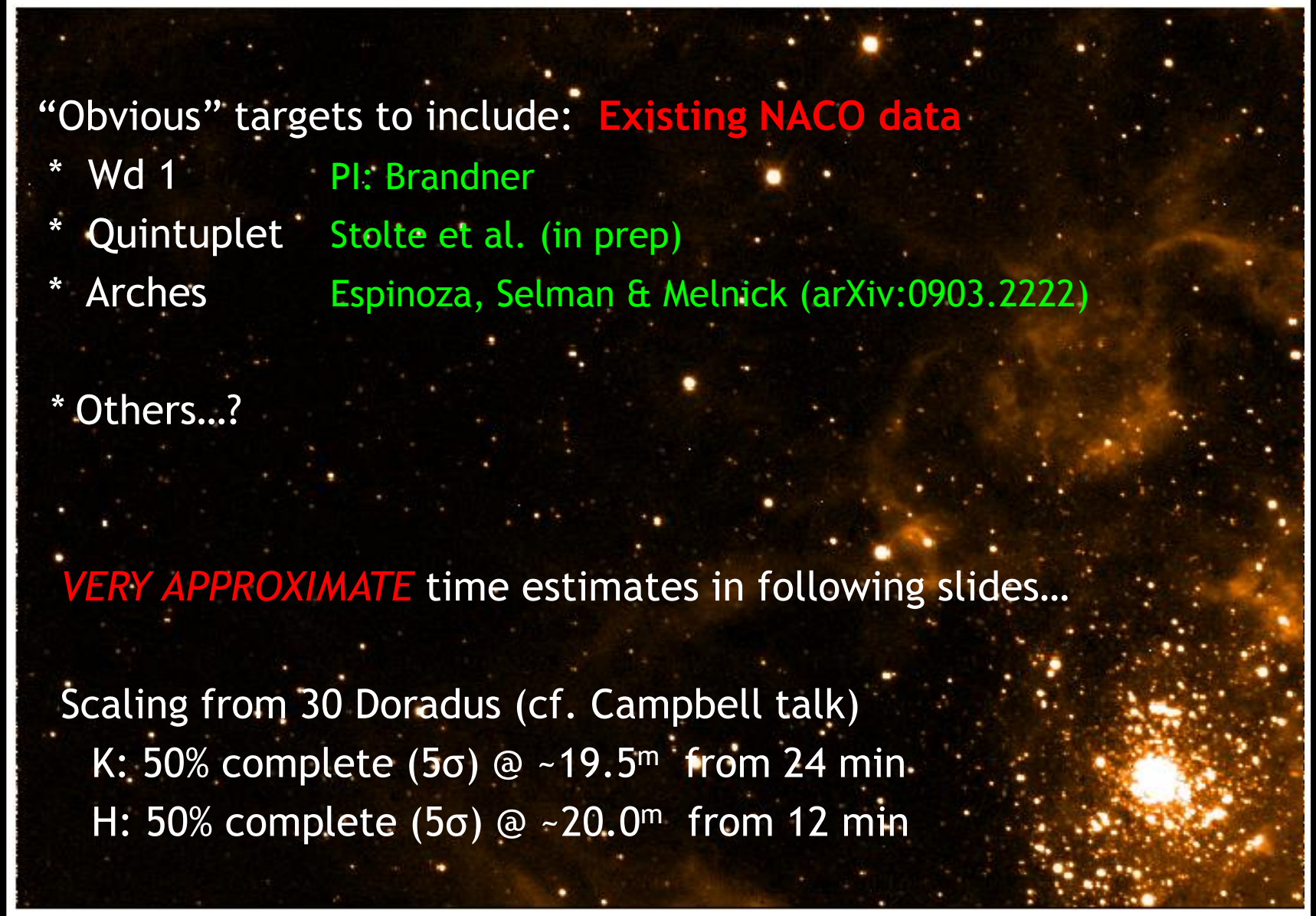
Massive Clusters: Beyond the Galactic Centre



"Obvious" targets to include: **Existing NACO data**

* Wd 1 — PI: Brandner
* Quintuplet — Stolte et al. (in prep)
* Arches — Espinoza, Selman & Melnick (arXiv:0903.2222)

Massive Clusters: Beyond the Galactic Centre



"Obvious" targets to include: **Existing NACO data**

* Wd 1 — PI: Brandner
* Quintuplet — Stolte et al. (in prep)
* Arches — Espinoza, Selman & Melnick (arXiv:0903.2222)

* Others…?

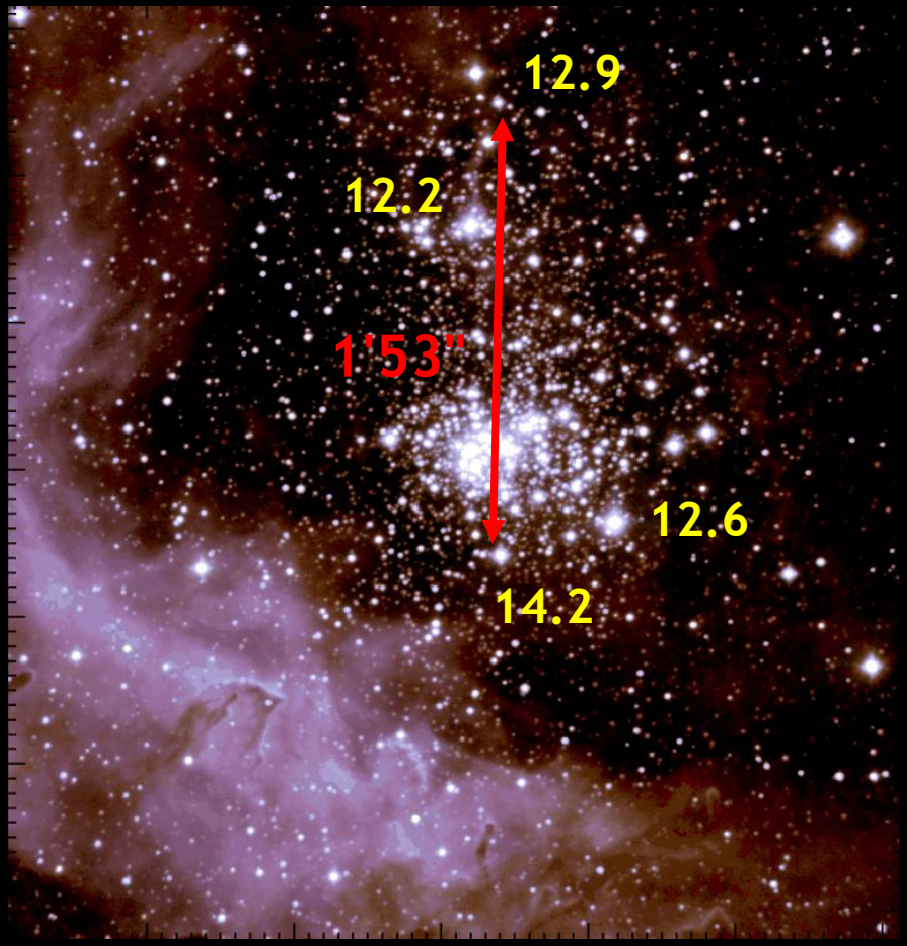
VERY APPROXIMATE time estimates in following slides…

Scaling from 30 Doradus (cf. Campbell talk)

K: 50% complete (5σ) @ ~19.5^{m} from 24 min

H: 50% complete (5σ) @ ~20.0^{m} from 12 min

MW: Westerlund 2

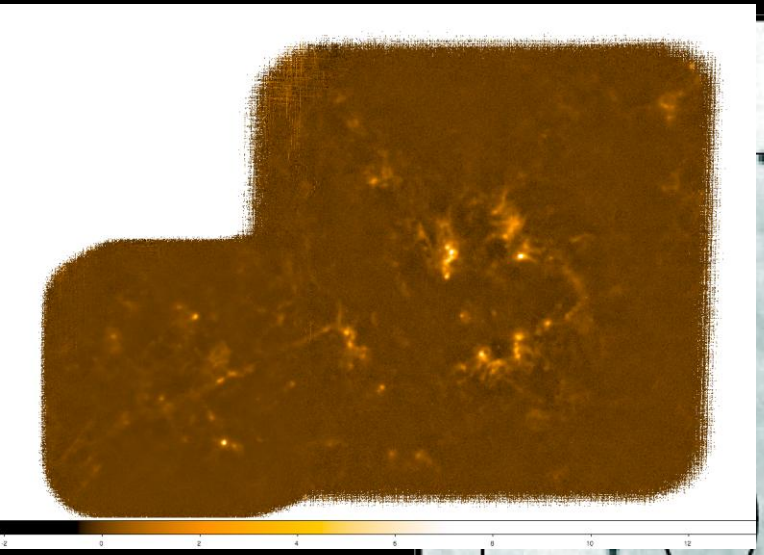


NTT-SOFI, 3.7x4.1 arcmin
Ascenso et al. (2007)

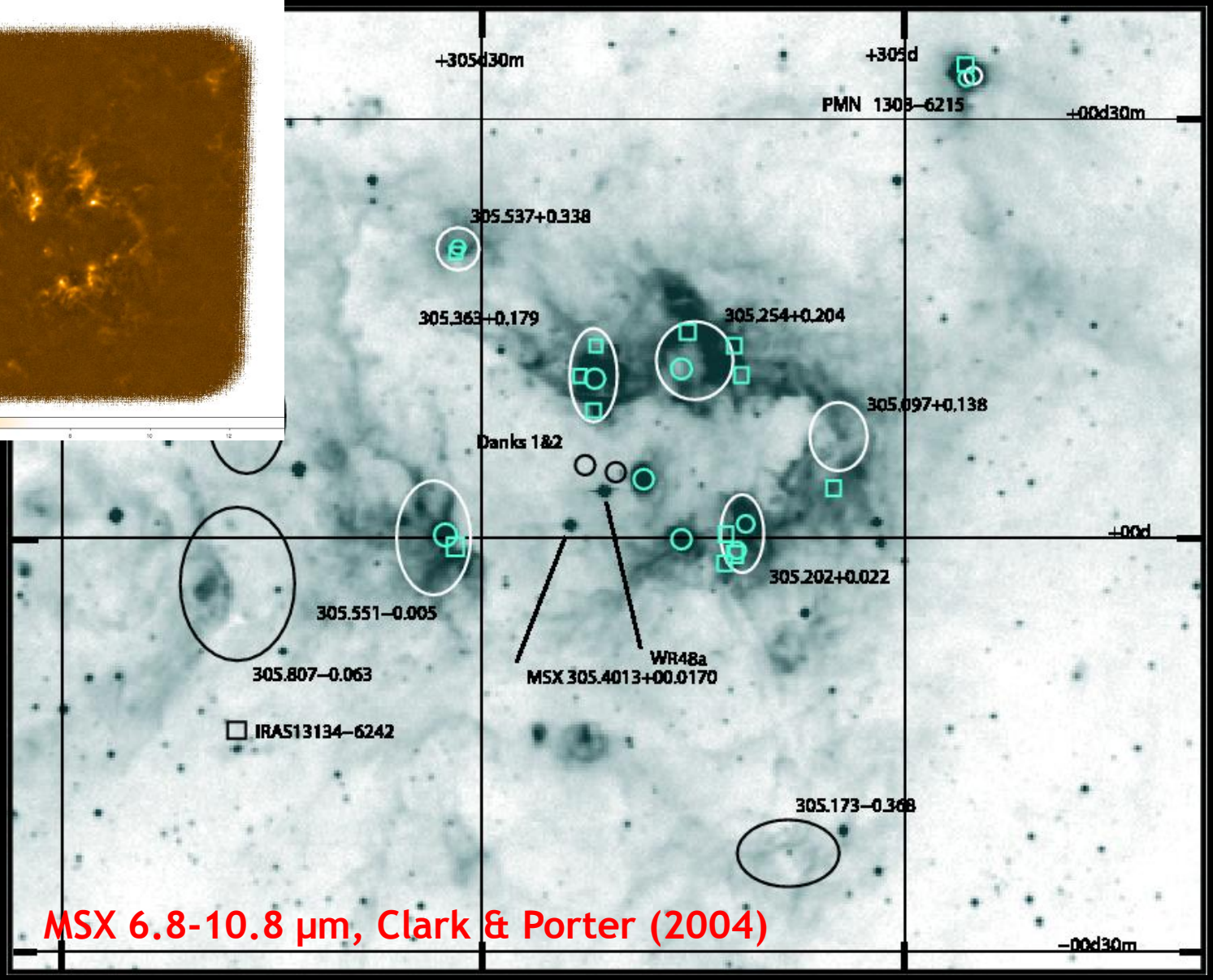
NGS = feasible
Total exp. (to K<18) ~ 5 mins
Total (JHK) + overheads <30mins

But, two stars with K = 7.6/8.7.
Saturated with 1s DIT
(K<9.6, in NGC3603, Alves/Ascenso)

MW: G305 – Triggered star-formation

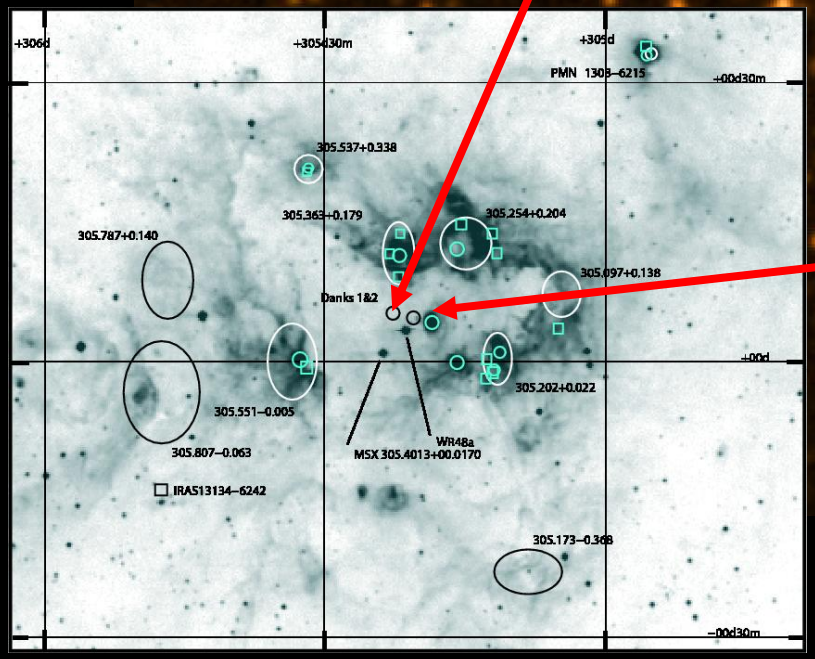


APEX-LABOCA
Clark et al.
(in prep)



MSX 6.8-10.8 μm, Clark & Porter (2004)

MW: G305 - Danks 1 & 2



Danks 1

14.6

11.5

13.9

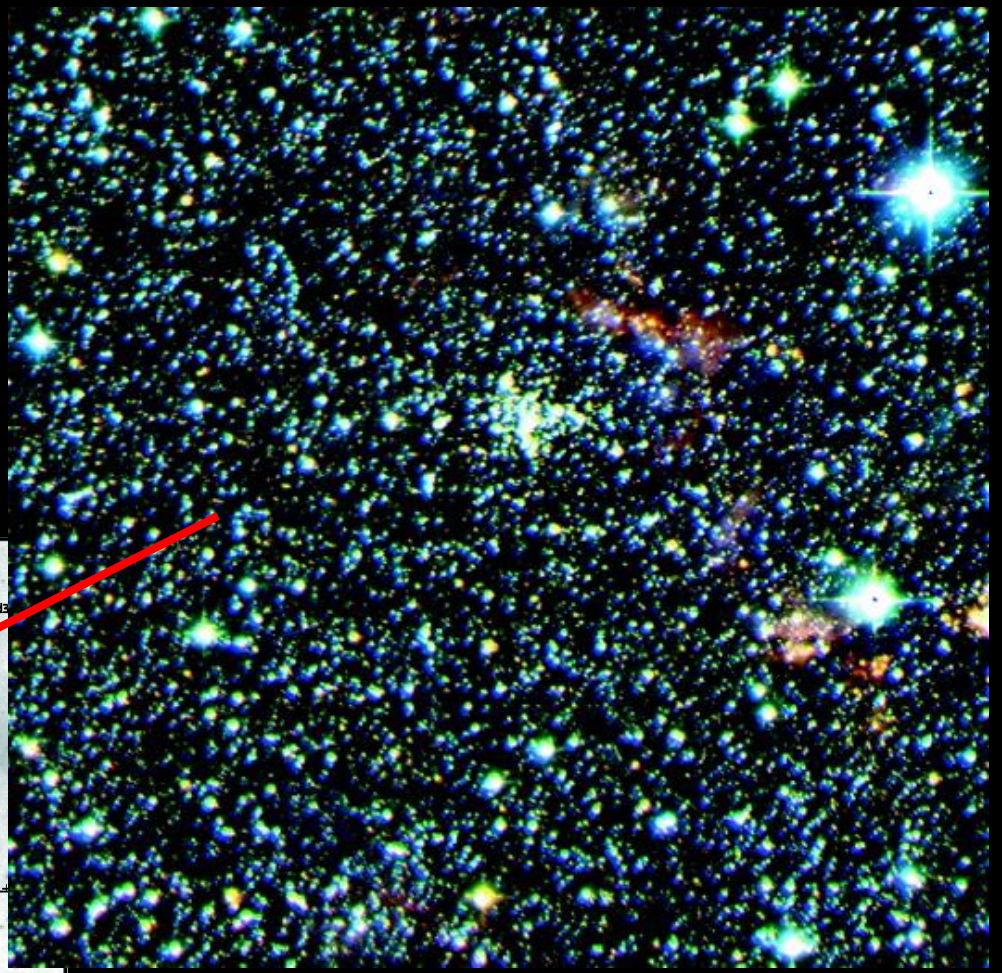
14.5

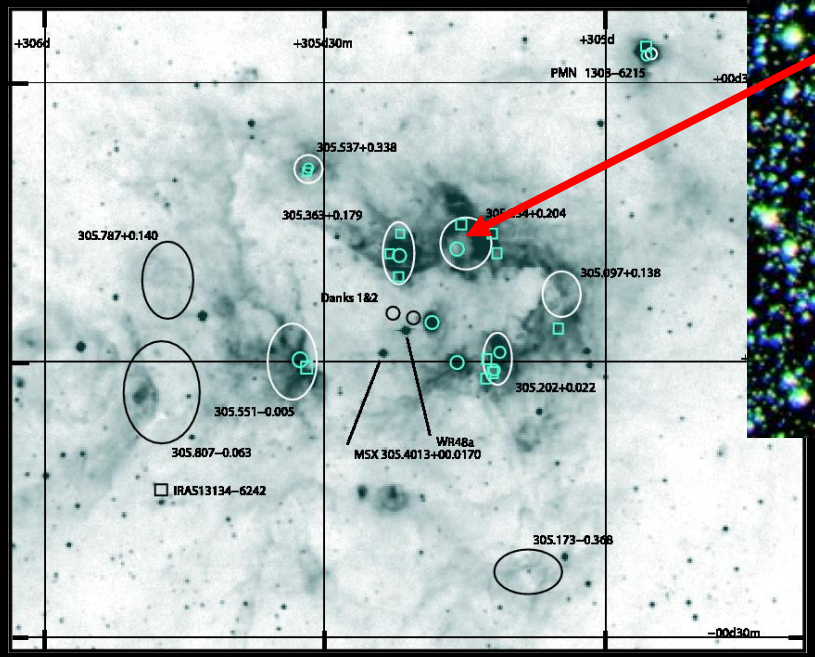
12.4

15.5

Danks 2

MW: G305.3 +0.2



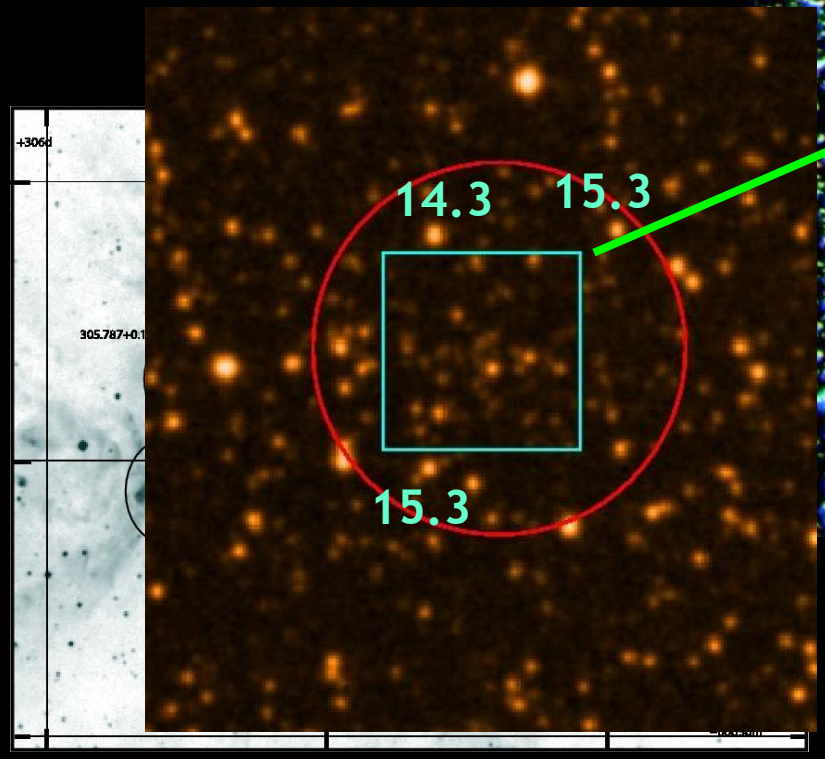


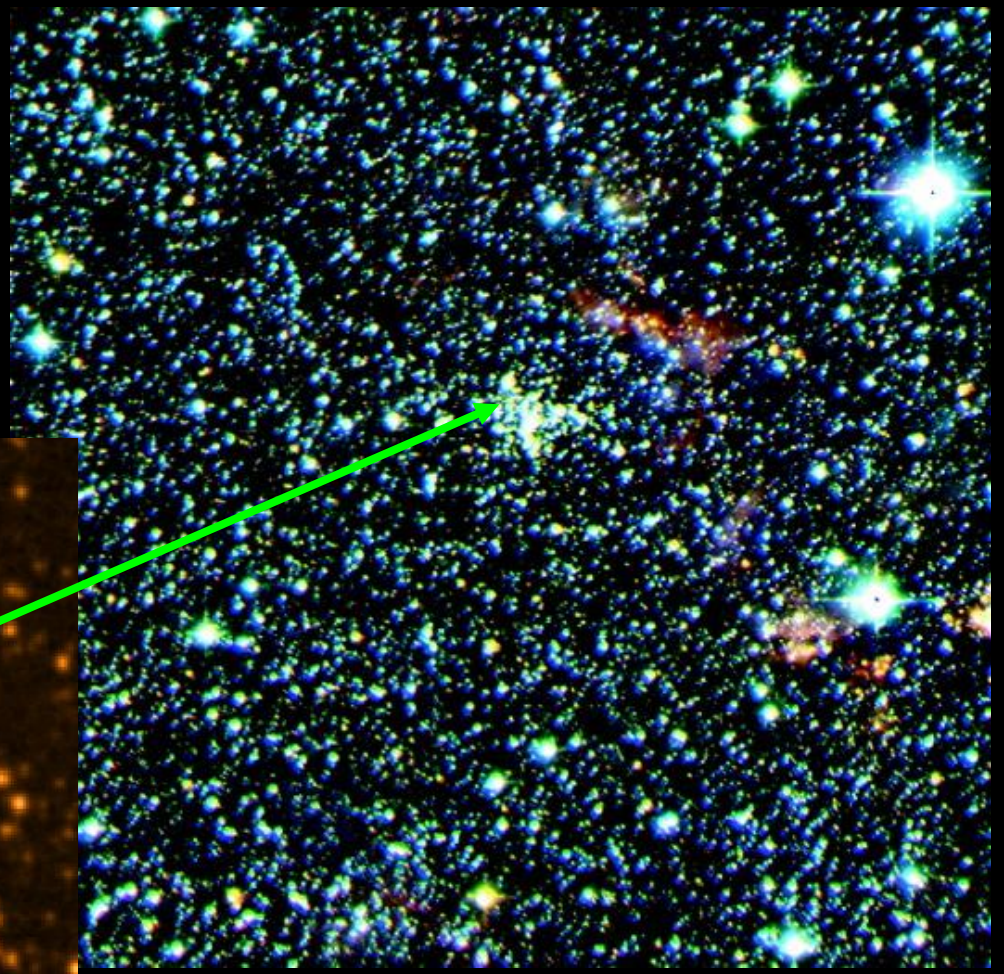
JHK AAT-IRIS2

Leistra et al. (2005), 8x8 arcmin

MW: G305.3 +0.2

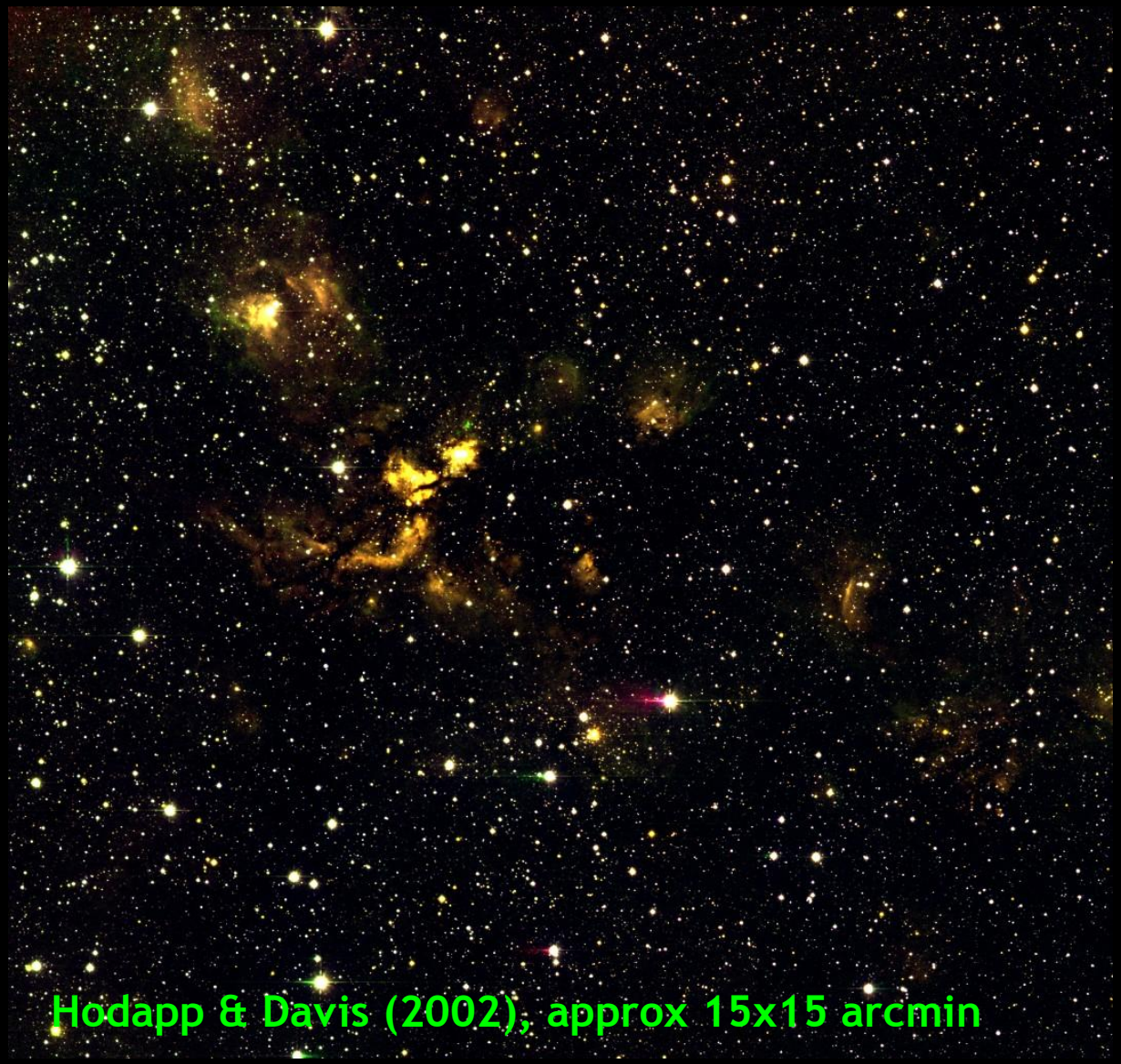
Exp. time:
Danks 1, 2 & G305.3+0.2
5 MAD fields in 3 pointings
JHK ~ 2500s/field
Total ~ 3.5 hrs



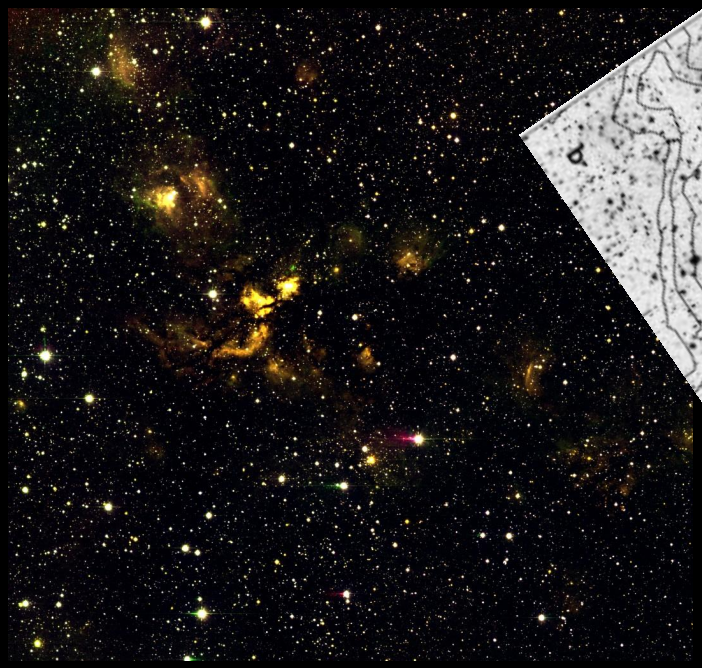


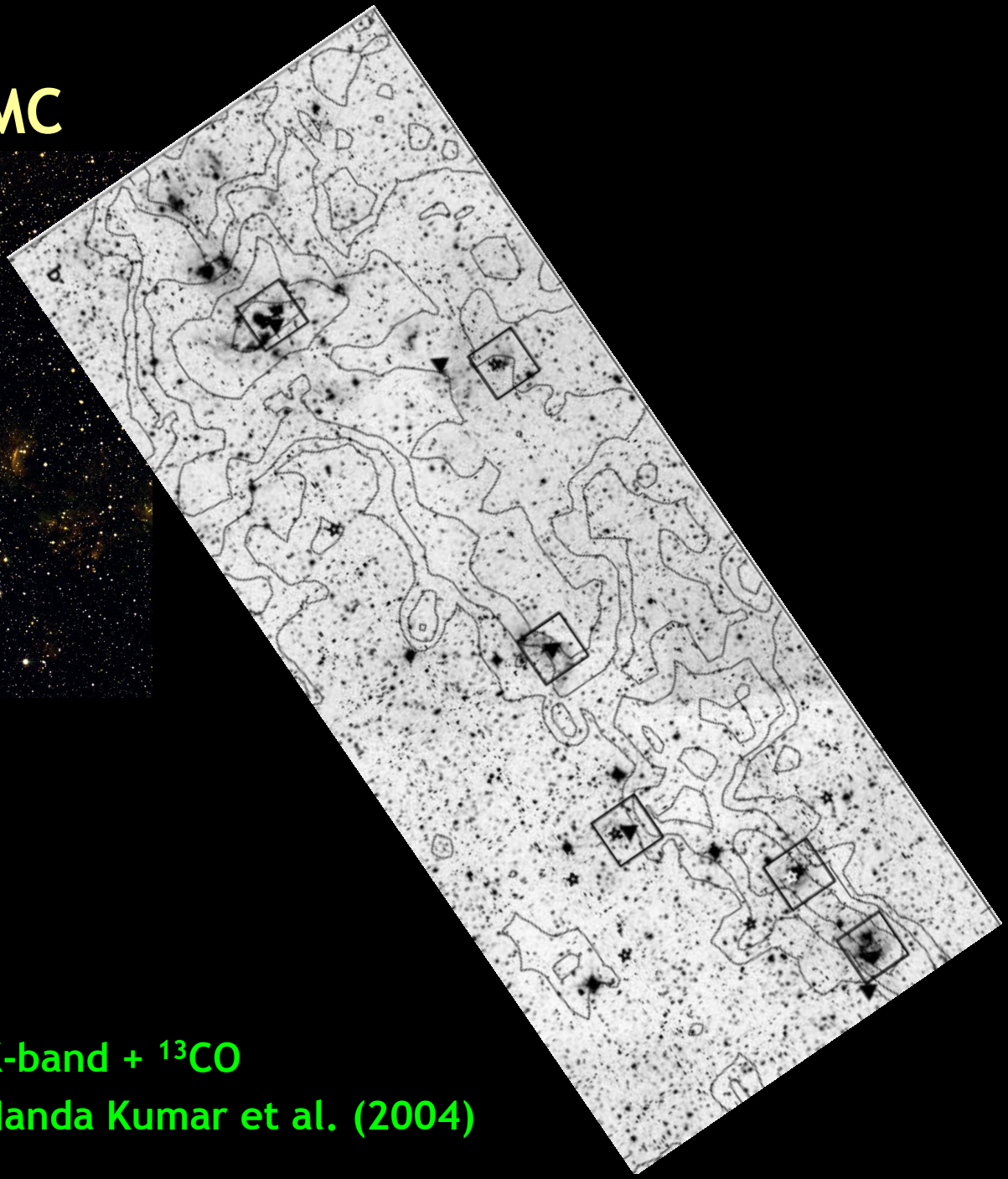
JHK AAT-IRIS2
Leistra et al. (2005), 8x8 arcmin

MW: W51 GMC



MW: W51 GMC

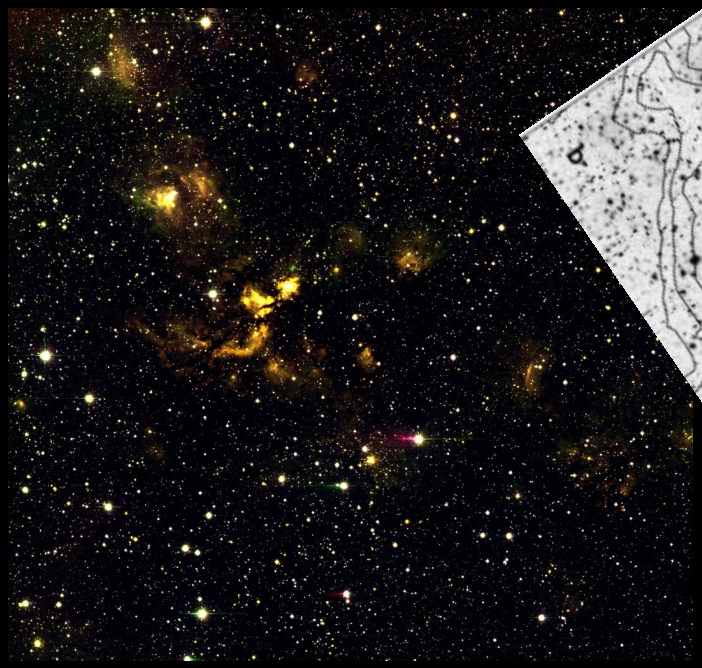




K-band + ^{13}CO

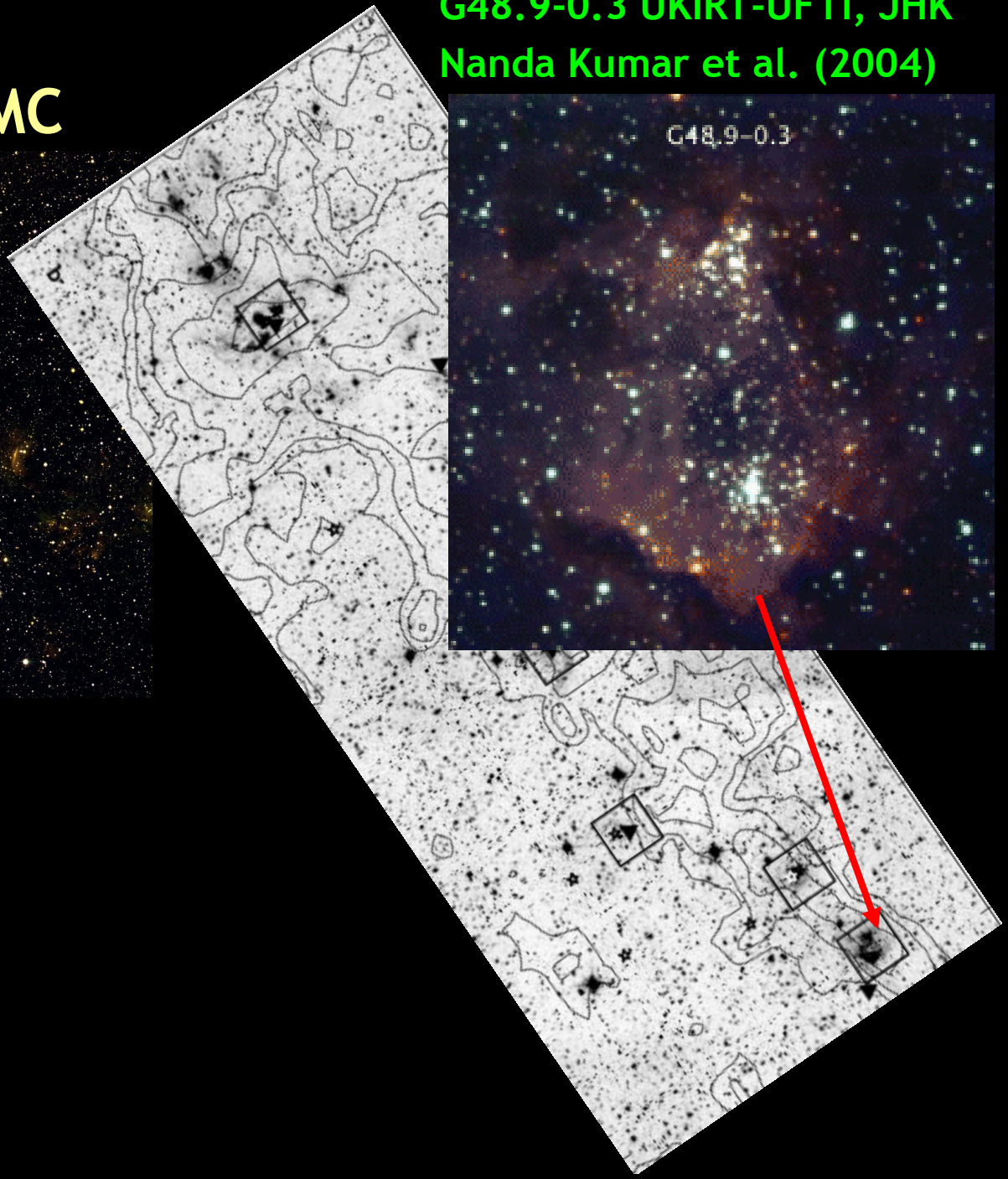
Nanda Kumar et al. (2004)

MW: W51 GMC

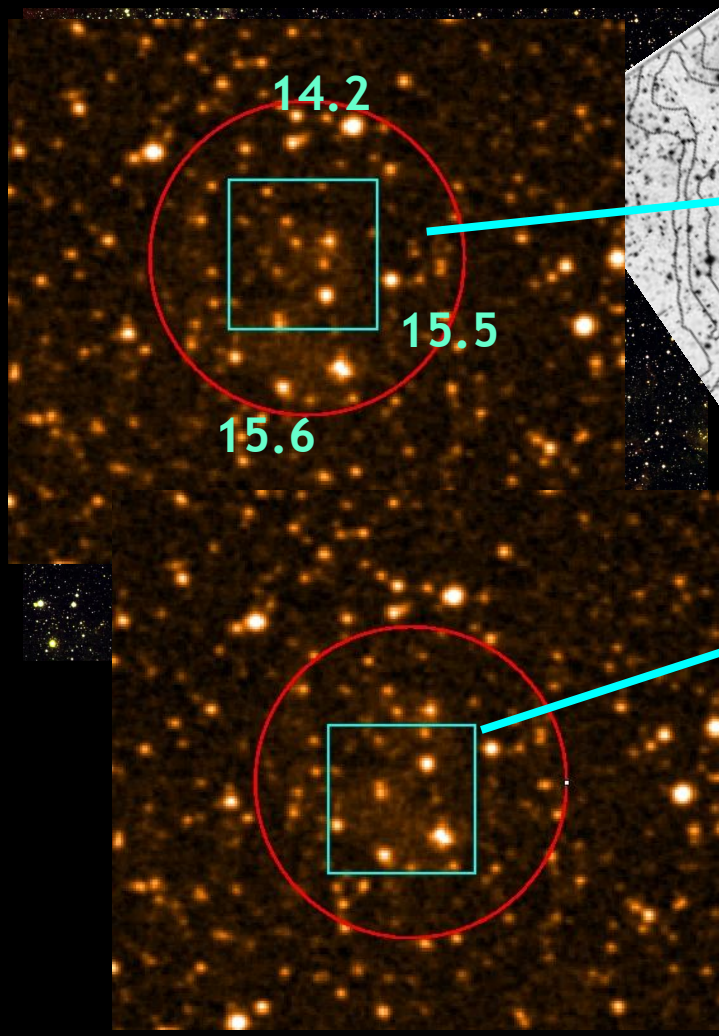


G48.9-0.3 UKIRT-UFTI, JHK

Nanda Kumar et al. (2004)



MW: W51 GMC



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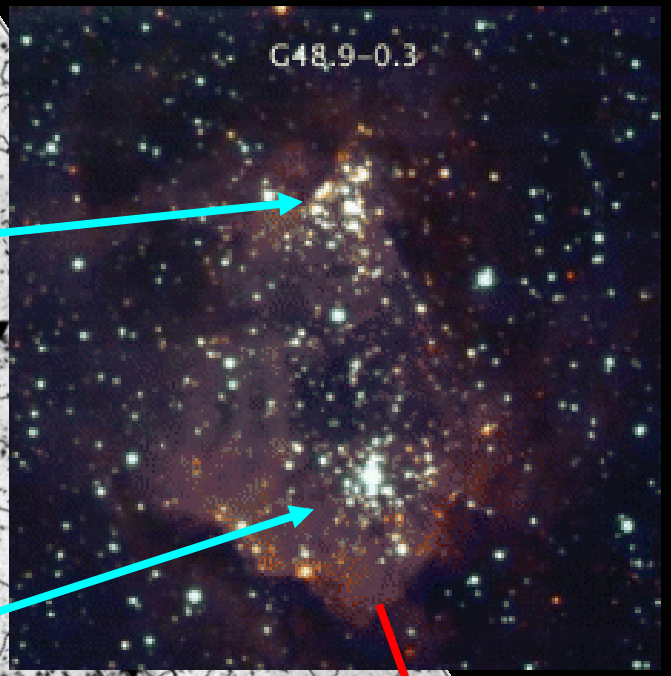
Nanda Kumar et al. (2004)



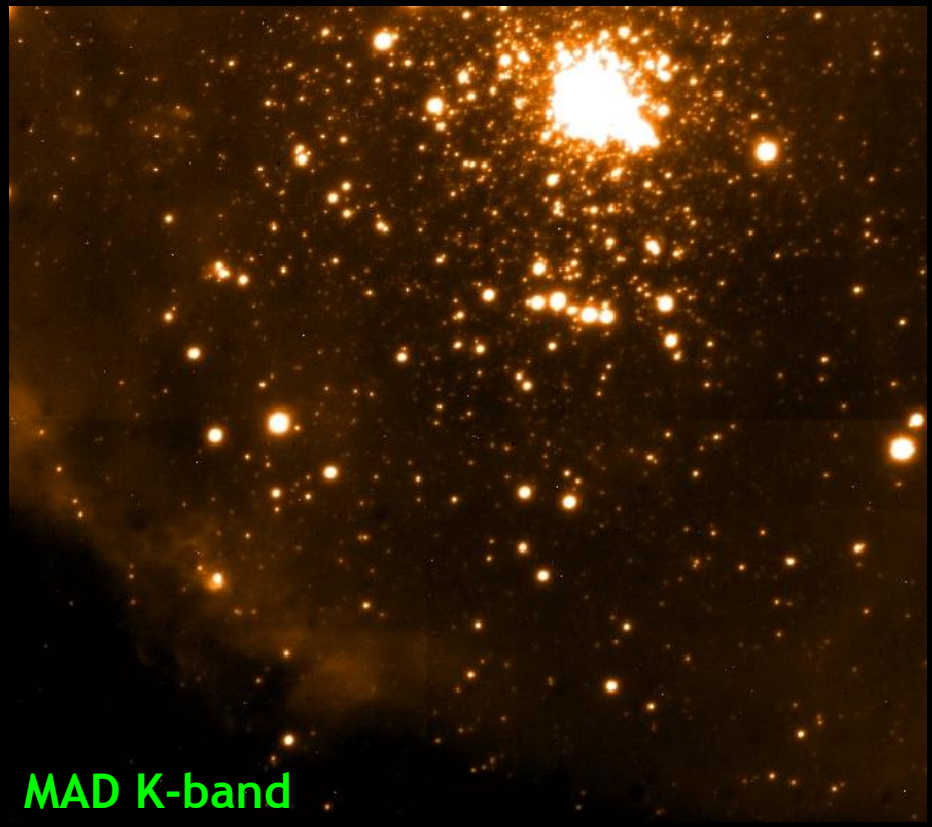
Exp. time: Half a dozen MAD fields

JHK ~ 2500s/field, Total ~ 4 hrs

LMC: 30 Doradus

Broader and/or deeper than SV data?

- WFC3 Early Release Program:
  U to H-band
- Match with a K-band mosaic?
- Prob. not high-priority



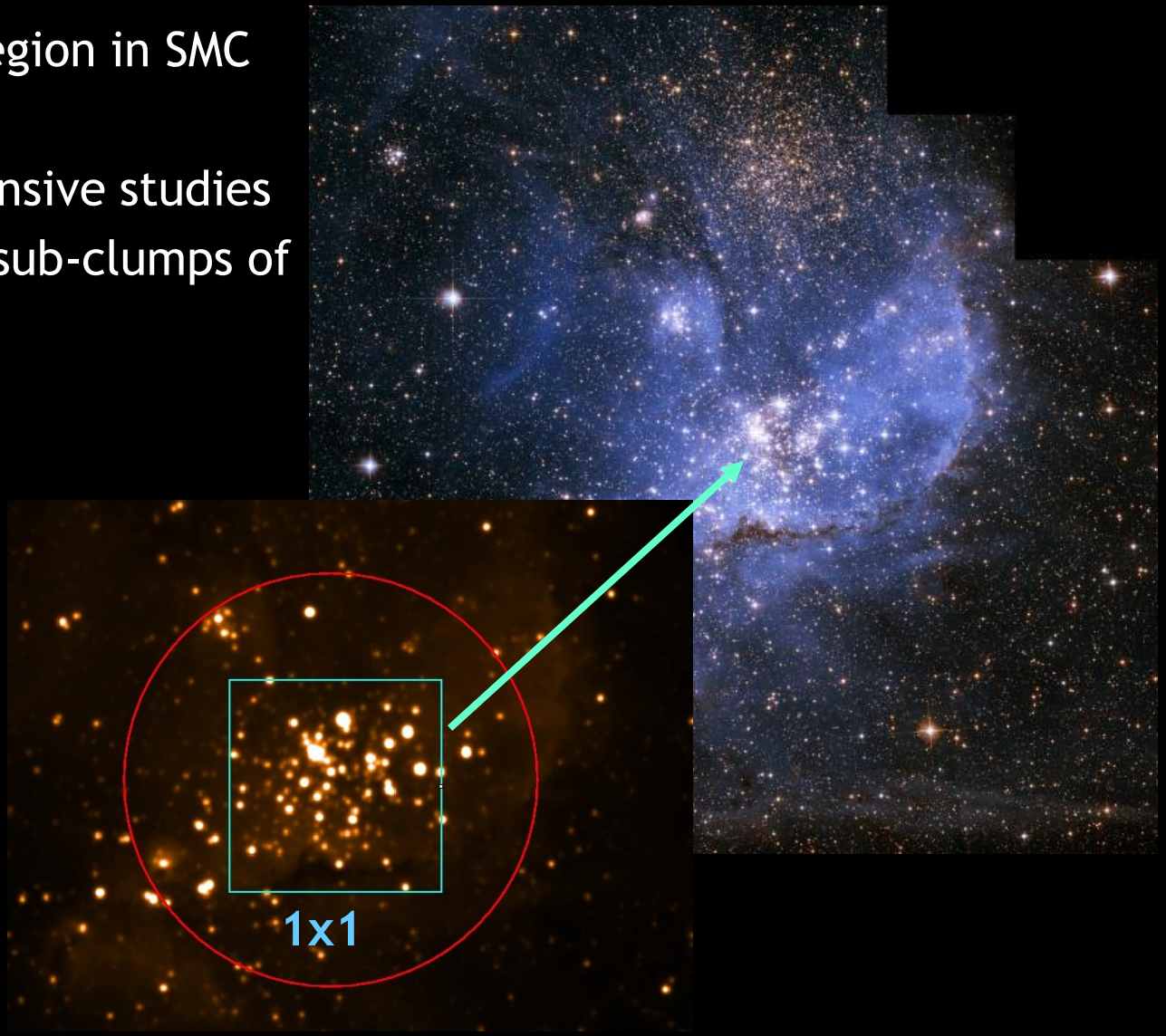
MAD K-band

SMC: NGC 346

NGC 346 – largest HII region in SMC

Deep *VI* ACS data, extensive studies of PMS population and sub-clumps of star formation

Not high priority



SMC: NGC 330

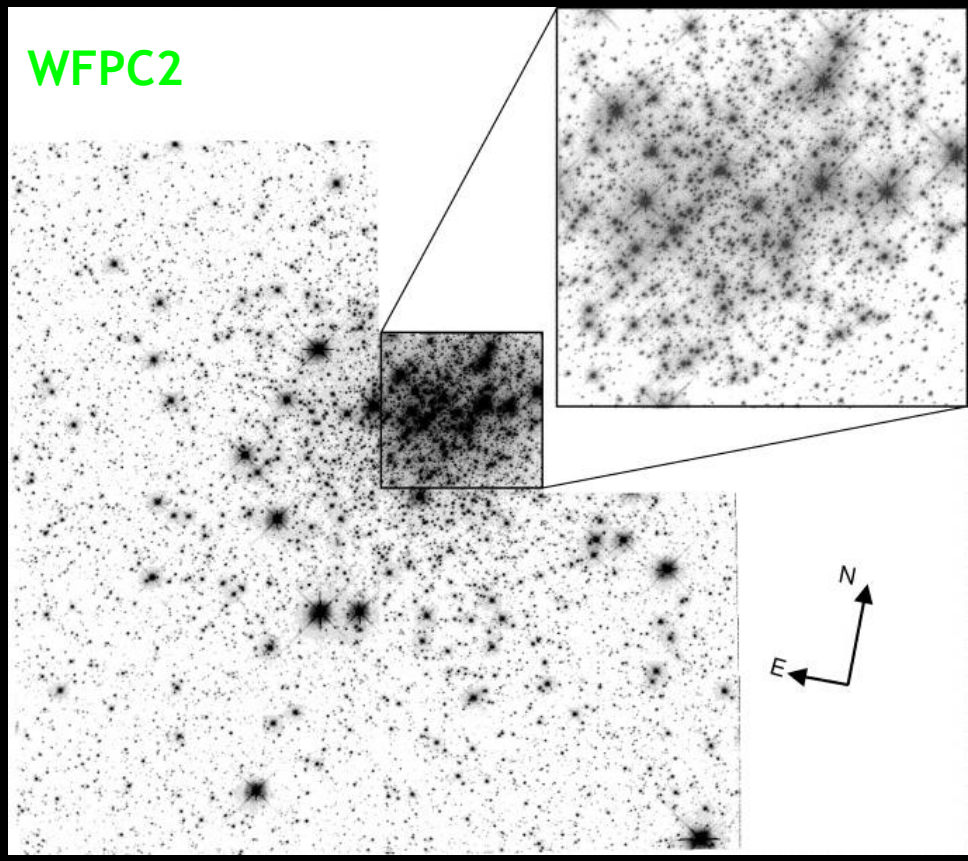
Slightly older cluster (~30 Myr)

Evidence for mass segregation

Sirianni et al. (2002)

Gouliermis et al. (2004)

Puzzling high number of evolved emission-line stars…



SMC: NGC 330

Slightly older cluster (~30 Myr)

Evidence for mass segregation

Sirianni et al. (2002)

Gouliermis et al. (2004)

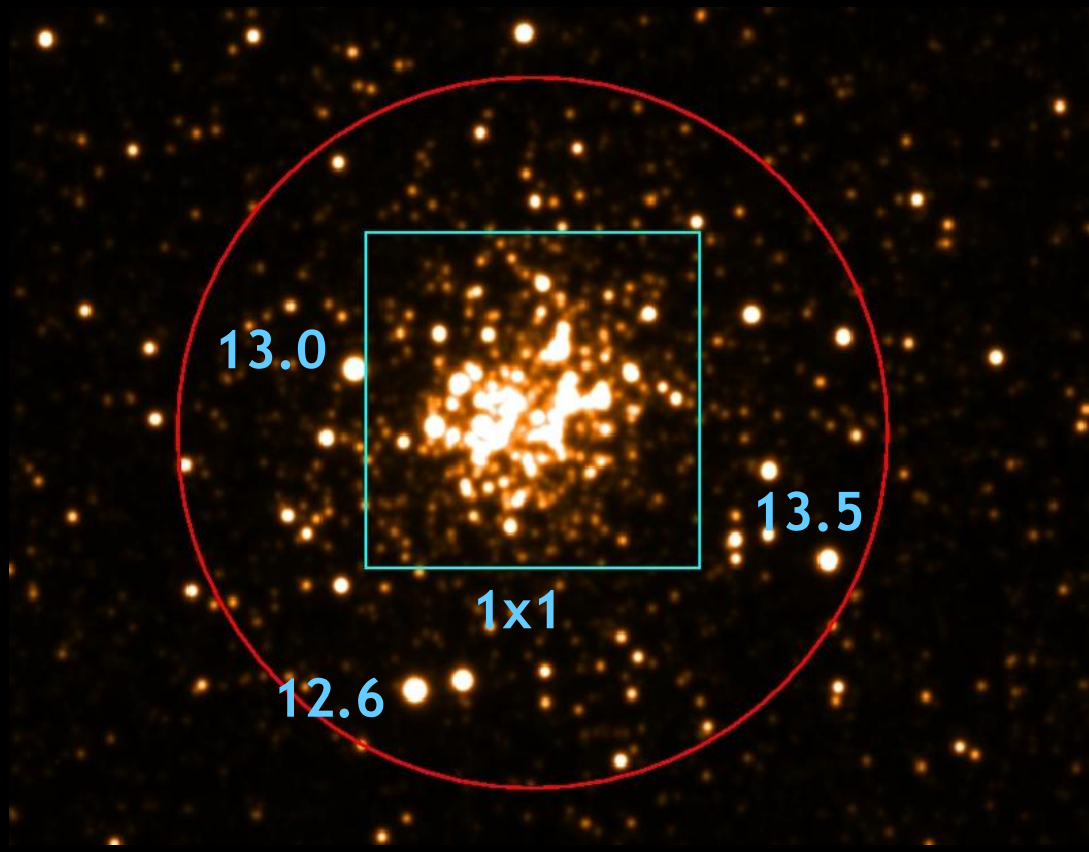
Puzzling high number of evolved emission-line stars…

0.5 mag fainter than 30 Dor but with “Bright NGS”

H, *K*, *Br-γ*

12/24/24 mins

+ overheads/slews ~ 3 hrs



Summary

Potential targets:

Westerlund 2	0.5 hrs
G305	3.5 hrs
W51	4 hrs
NGC 330	3 hrs
Total	~11 hrs

Lots more if time permits, such as:

- W49 GMC (cf. Alves & Homeier)
- Embedded s-f regions in N11 (LMC)

Plus: Wd1, Arches, Quintuplet
to complement/revisit NACO data?

Targets that were frustratingly just out of reach with MAD, now become extremely attractive with MAD-MAX!