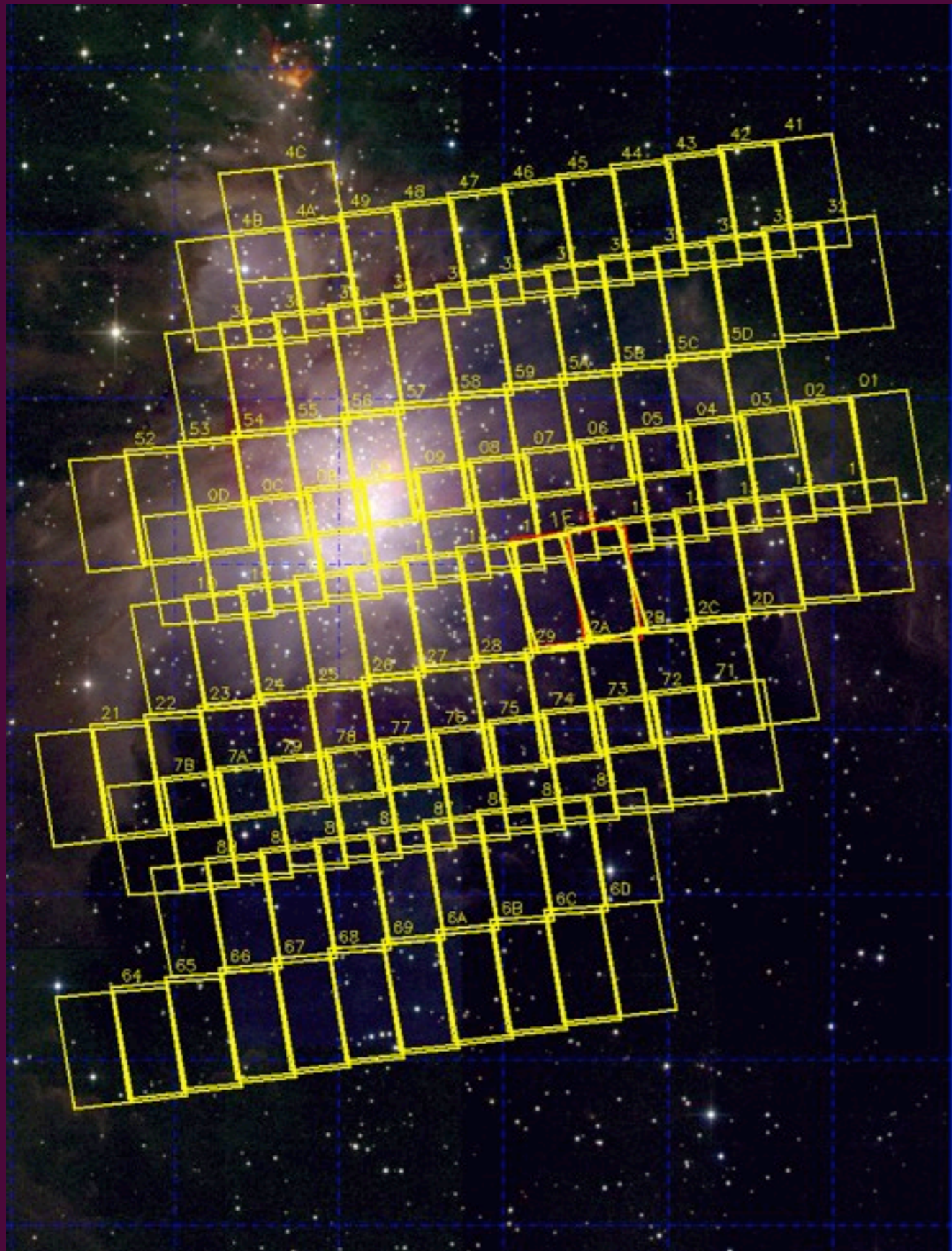


# Visual Binaries in the Orion Cluster:

So close you can hardly see them.

Sara Alejandra Sans  
Advisor: Massimo Robberto  
Space Telescope Science Institute  
August 19, 2010

# THE DATASET



## HST Cycle 13

ACS, WFPC2, NICMOS + 2 other  
ground based imagers survey

**ACS/WFC:** 600 arcmin<sup>2</sup> mosaic  
centered on the Trapezium (104  
fields)

Five ACS Filters:

F435W, F555W, F658N(H $\alpha$ ), F775W,  
F850LP

## Previous ACS Dataset

Obtained by Bally et al.

412 arcmin<sup>2</sup>

excludes 60'' centered on  $\theta^1$  Ori C  
26 ACS Fields

One filter: F658N

# ACS CATALOGUE EXAMPLE

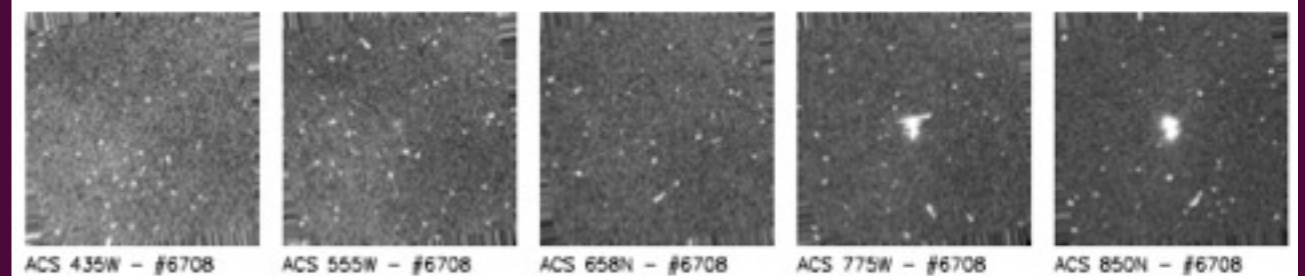
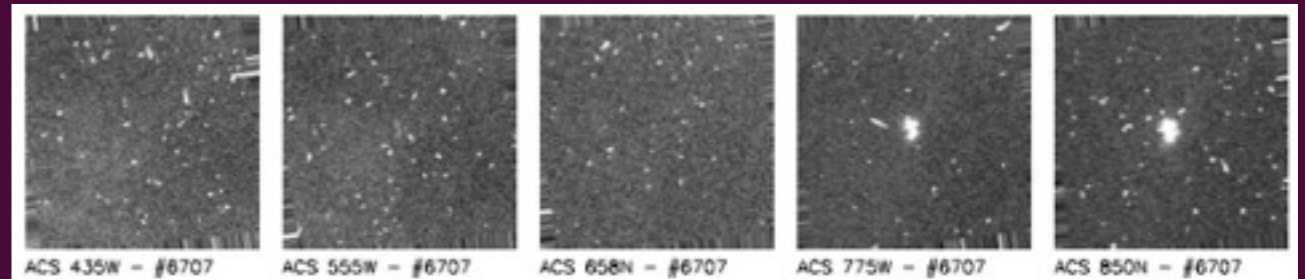
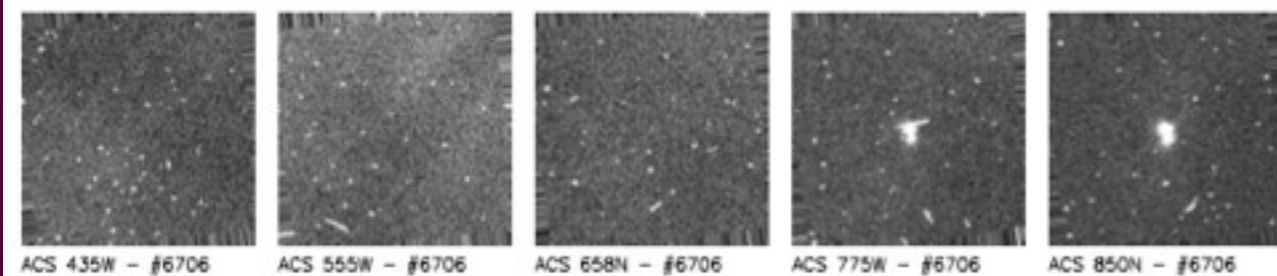
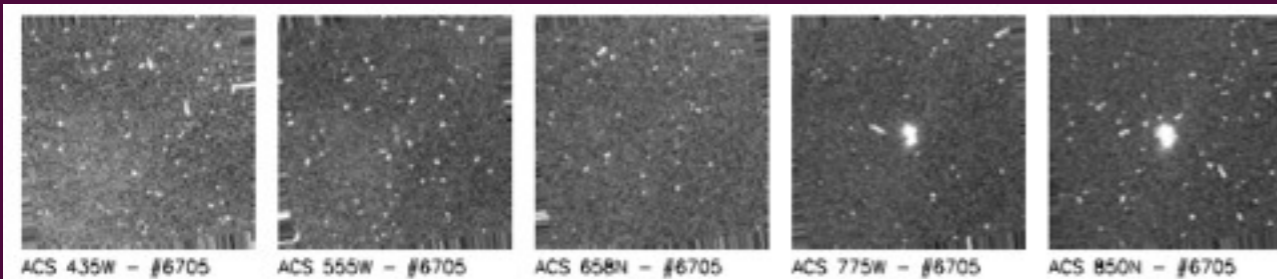
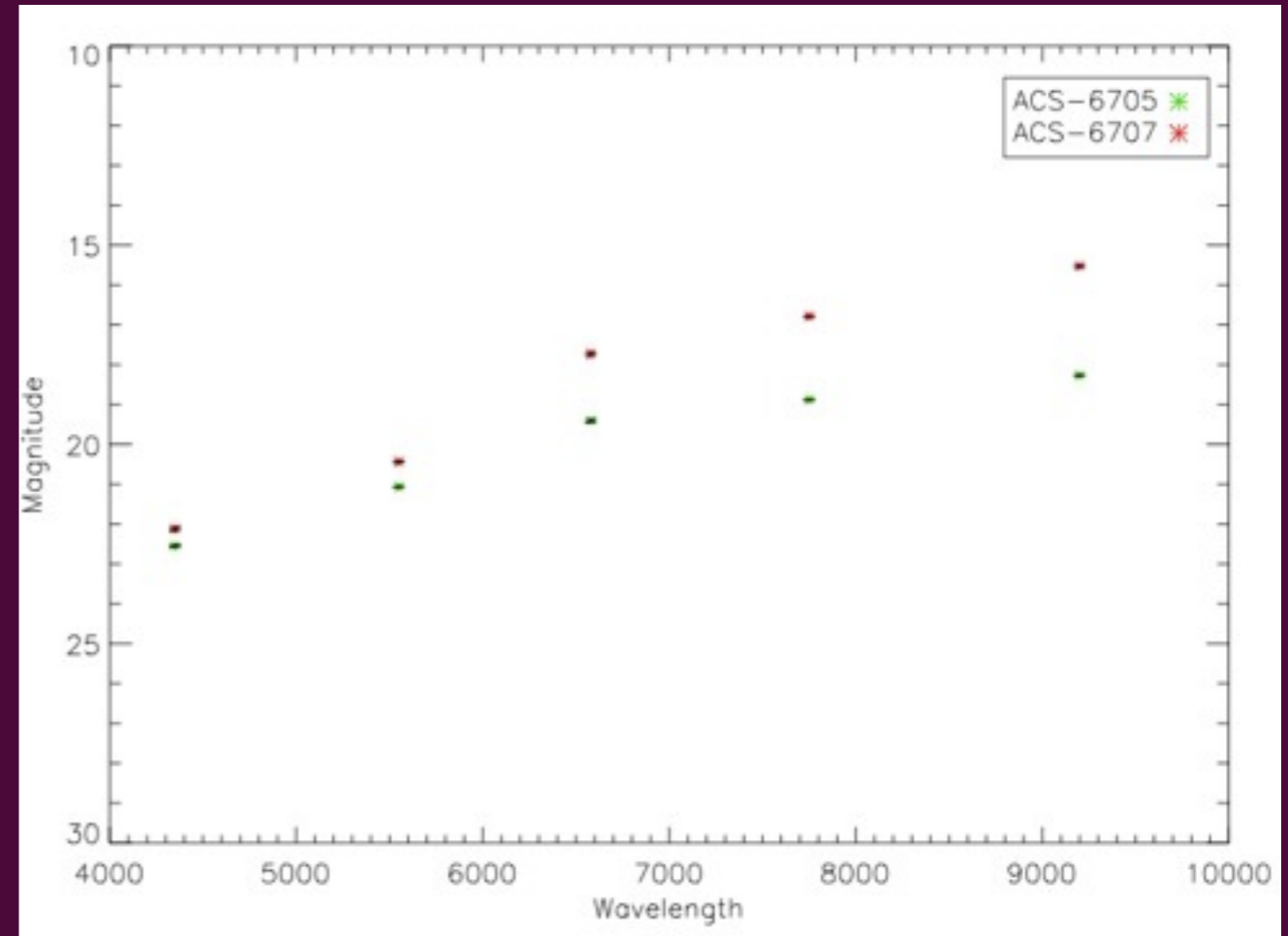
ACS Sources:

6705, 6707

Detections:

6705, 6706, 6707, 6708

Mag435: $22.5490 \pm 0.022$ ,	$22.1220 \pm 0.022$
Mag555: $21.0650 \pm 0.011$ ,	$20.4400 \pm 0.011$
Mag658: $19.4090 \pm 0.033$ ,	$17.7290 \pm 0.033$
Mag775: $18.8870 \pm 0.005$ ,	$16.7930 \pm 0.005$
Mag850: $18.2680 \pm 0.005$ ,	$15.5270 \pm 0.005$



# Binary Separation



Separation Range: .1" - 1.5"



# ACS binaries: ra-dec Spatial Distribution

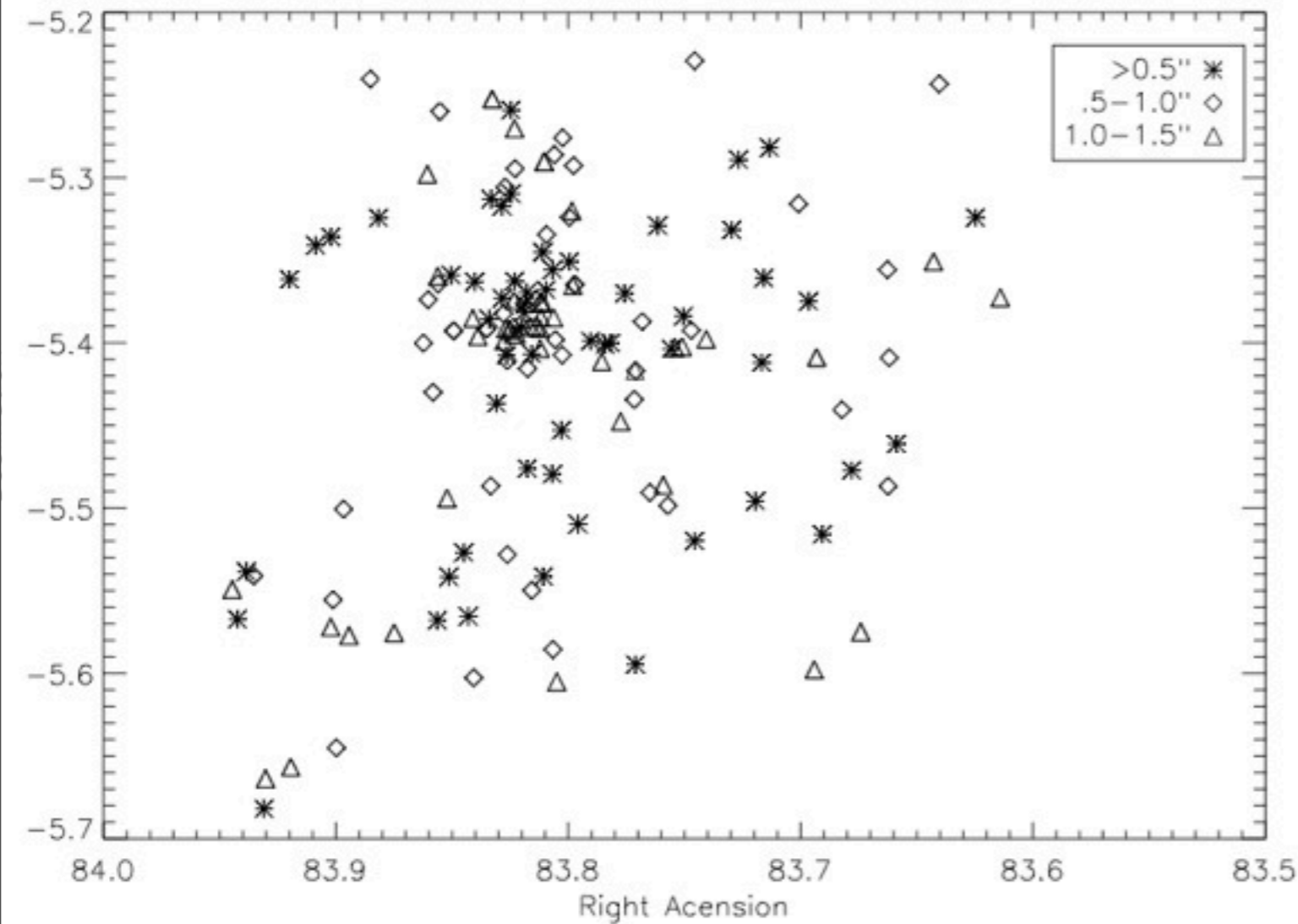
This survey

Total Sources: 291

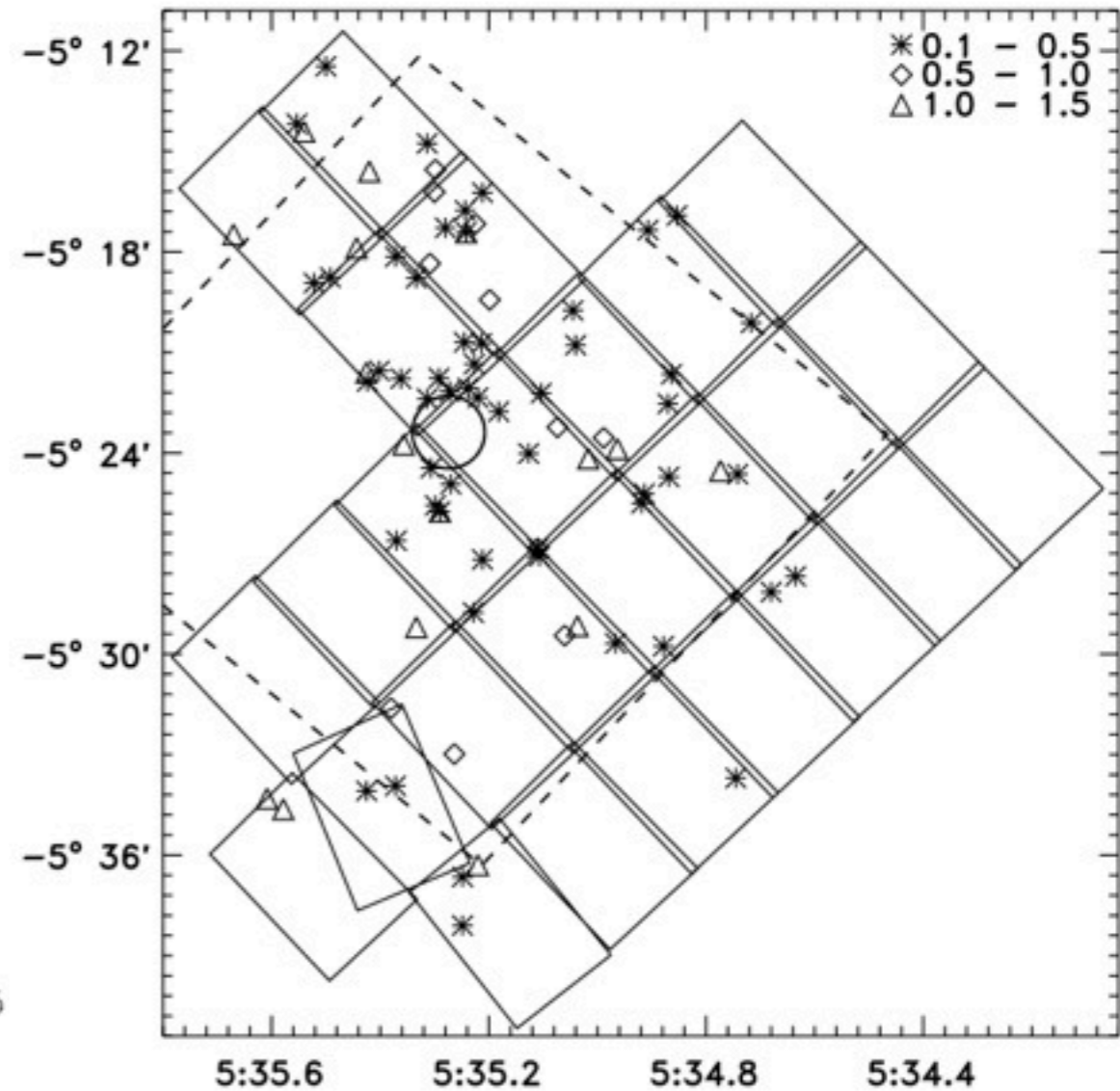
Bally's survey (Reipurth et al. 2007)

Total Sources: 78

Visual Binaries in the Orion Nebula Cluster



VISUAL BINARIES IN THE ORION NEBULA CLUSTER

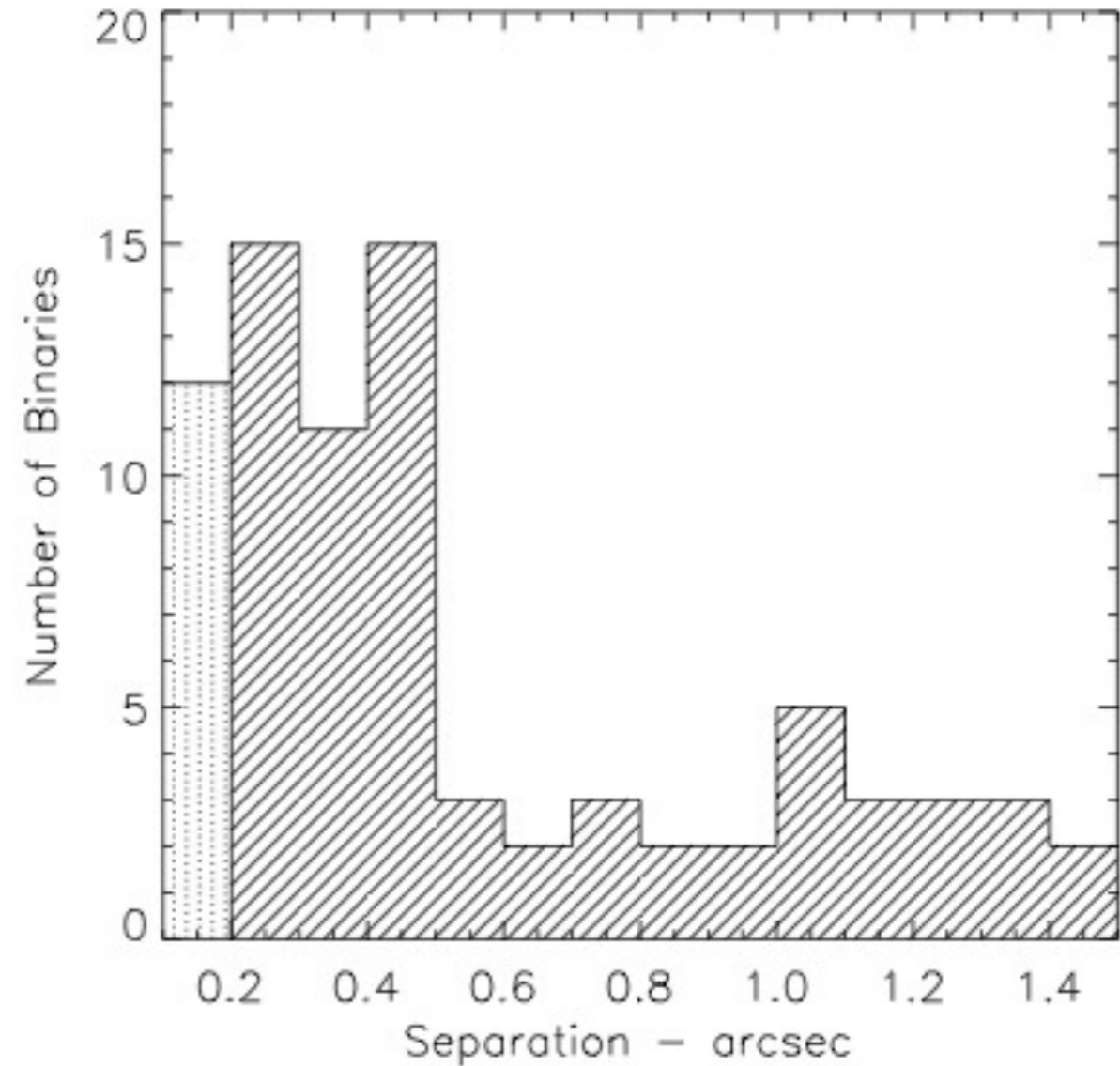
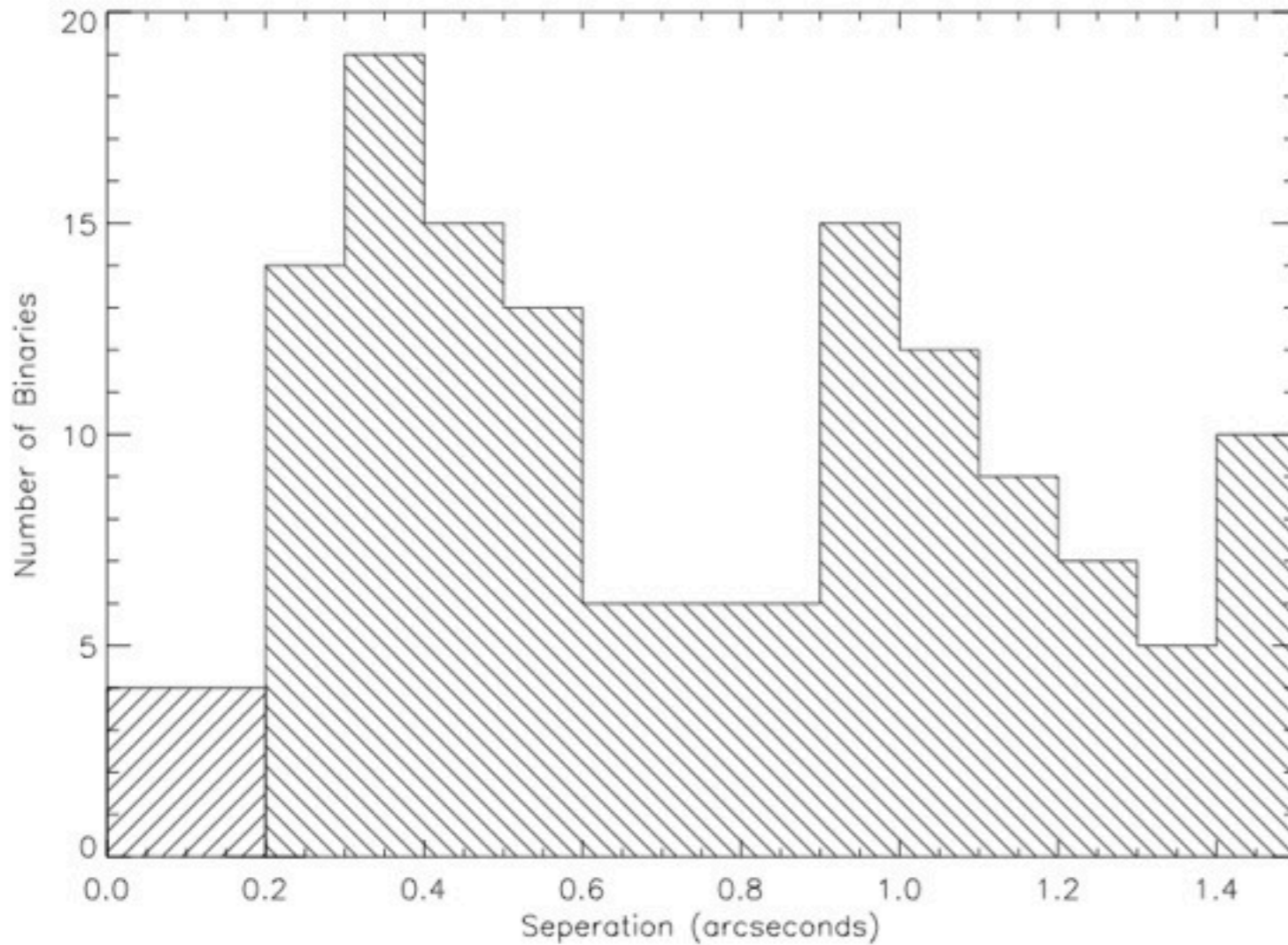


Some discrepancies remains due to the identification of close ( $0.1''-0.2''$ ) binaries

# Binary Separations

This Survey

Bally's survey (Reipurth et al. 2007)



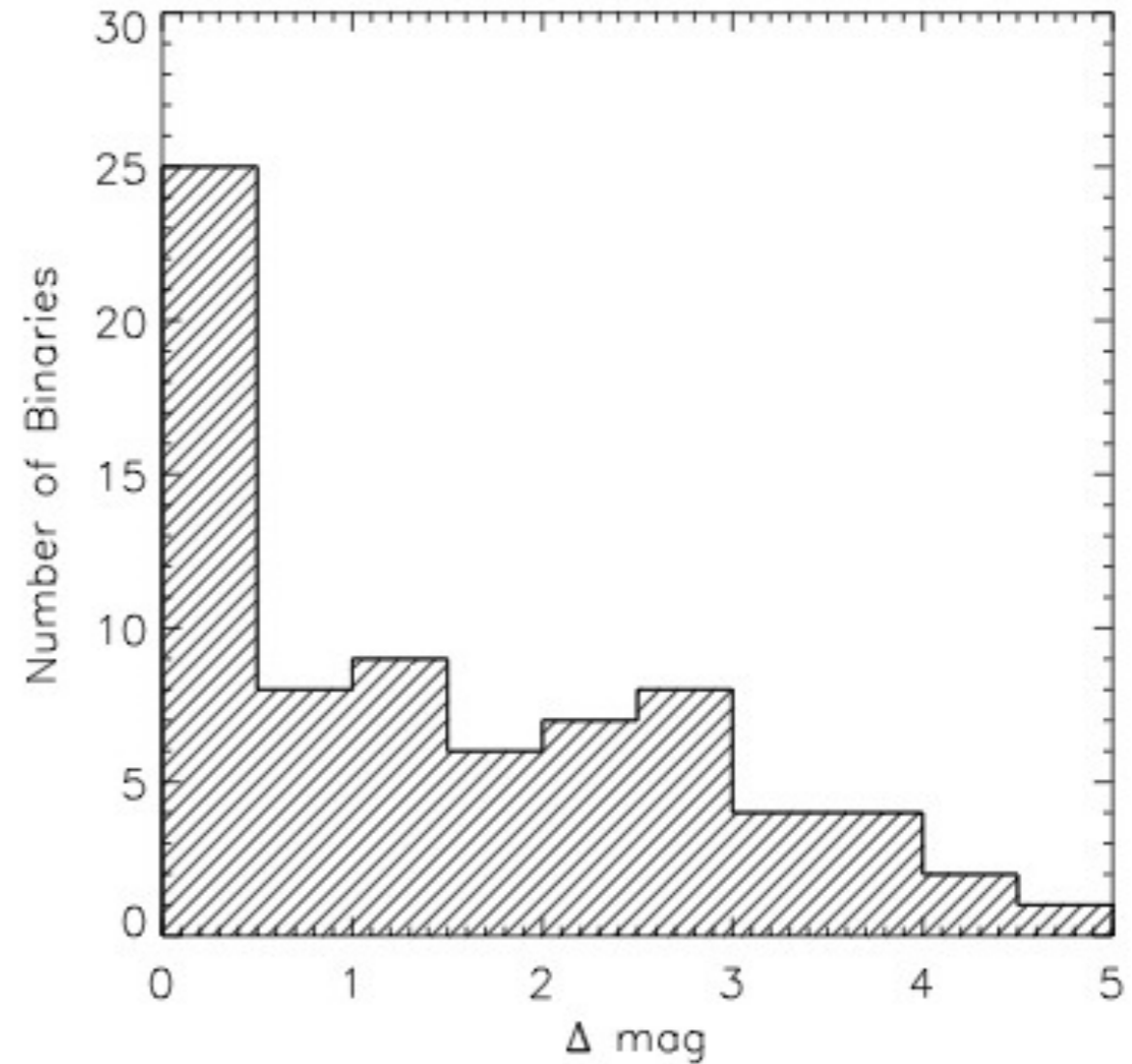
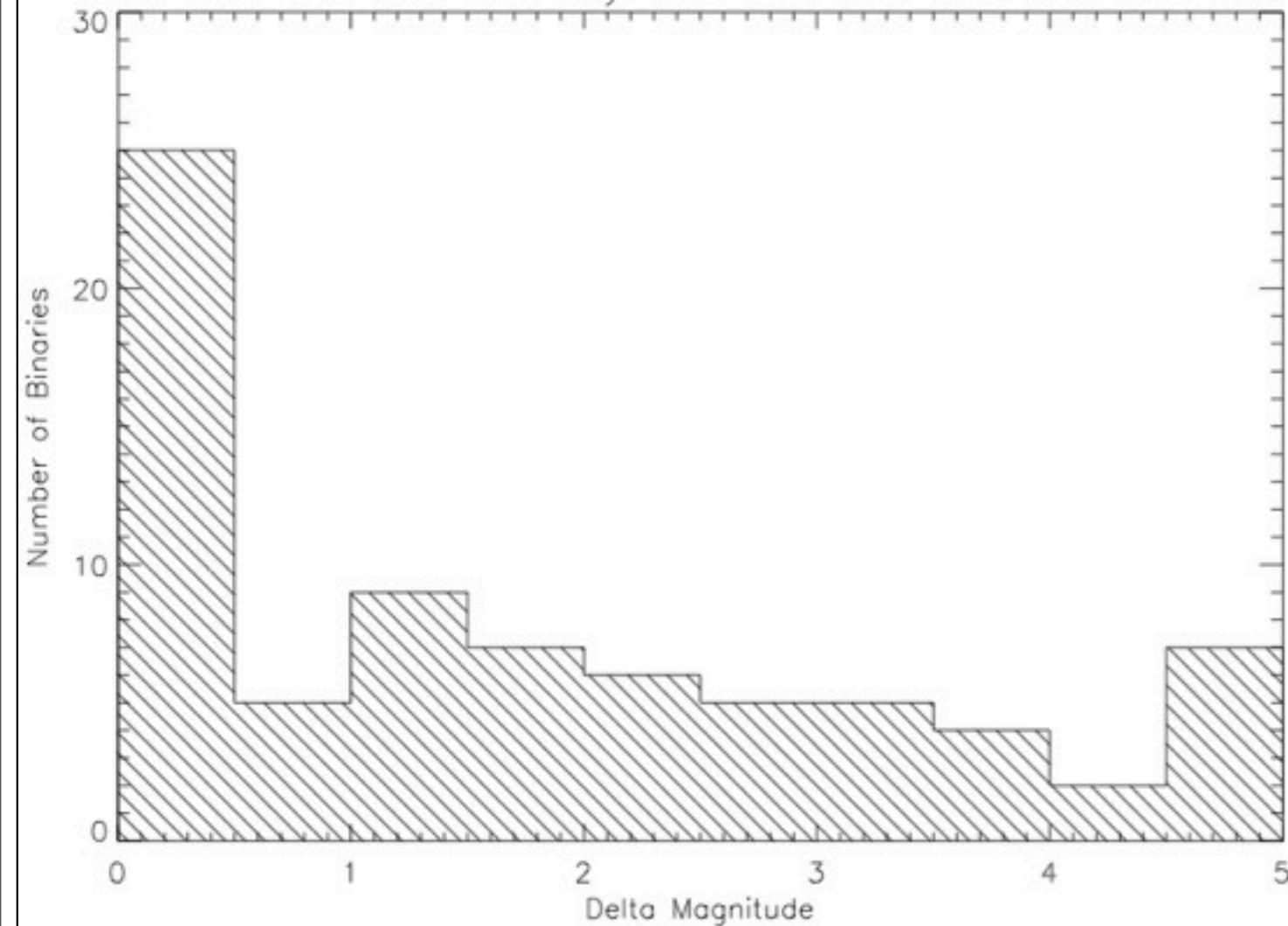
Our data shows a spike in the .9 to 1.2 bins, suggestive of a large frequency of 400-500 AU separations

# Binary Luminosity Ratios

This Survey

Bally's survey (Reipurth et al. 2007)

Luminosity Ratios of Binaries



Our data shows a nearly identical distribution with major differences occurring in the last bin.

# References

Reipurth, Bo, Marcelo M. Guimaraes, Michael S. Connelley, and John Bally. "Visual Binaries in the Orion Nebular Cluster." *The Astronomical Journal* 134 (2007): 2272-2285

Ricci, Luca, Massimo Robberto, and David Soderblom. "The Hubble Space Telescope/Advanced Camera for Surveys Atlas of Protoplanetary Disks in the Great Orion Nebula." *The Astronomical Journal* 136 (2008): 2136-2151.

Prosser, Charles, John Stauffer, Hartman Lee, David Soderblom, Burton Jones, Michael Werner, and Mark McCaughrean. "HST photometry of the trapezium cluster." *The Astronomical Journal* 421 (1994): 517-541.

Kohler, R. , M.G. Petr-Gotzens, M.J. McCaughrean, J. Bouvier, G. Duchene, A. Quirrenbach, and H. Zinnecker. "Binary Stars in the Orion Nebula Cluster." *Astronomy and Astrophysics* 458 (2006): 461-476.

GO Program 10246

# Acknowledgements

I would like to thank the Institute, in particular Dr. Bob Hanisch, Dr. Tracy Beck, Flory Hill, and Christine Rueters and the summer internship selection committee for such opportunity. I would also like to deeply thank Dr. Massimo Robberto for his excellent guidance during the summer and for providing me with such an interesting and multi layered project, as well as Carlo Mannara. I would also like to thank all the summer students a particularly fun summer.